

BRAZIL

**FORMOSO RIVER: INTEGRATED WATERSHED MANAGEMENT
AND PROTECTION**

MEDIUM-SIZED PROJECT BRIEF

(GEF)

EMBRAPA SOILS

JUNE 12, 2002

SUMMARY

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LIST OF ACRONYMS/ABBREVIATIONS

AGTEC	Agricultural Technology Development Project for (Prodetab)
ATRATUR	Local Tourist Attraction Association
CAS	Country Assistance Strategy
CBD	Convention on Biological Diversity
CEPA	Support Center for Rural Activities and Agricultural Production
CIDEMA	Inter-Municipal Consortium for the Development of the Miranda and Apa Rivers Watershed
CMDR	Local Rural Development Council
CNPq	National Scientific and Technological Council
COMTUR	Local Council of Tourism Affairs
CONDEMA	Local Council for Environmental Defense
ECOA	Ecologia e Ação
EMBRAPA	Brazilian Agricultural Research Corporation
EMPAER-MS	Mato Grosso do Sul State Agricultural Research and Rural Extension Corporation
ESALQ/USP	School of Agricultural Studies "Luiz de Queiroz" - University of São Paulo
FAO	Food and Agriculture Organization of the United Nations
FAT	Foundation Andre Tosello
FEMAP	State Environmental Foundation for the Pantanal
FIBGE	Brazilian Geography and Statistics Institute
FNMA	National Environment Fund
FUNBIO	Brazilian Biodiversity Fund
FUNDECT	Foundation for Support and Development of Education, Science and Technology of Mato Grosso do Sul
GEF	Global Environment Facility
GOB	Government of Brazil
GoMS	Government of the State of Mato Grosso do Sul
IAGRO	State Department for Inspection and Agricultural Defense
IBAMA	Brazilian Institute for the Environment and Renewable Natural Resources
IDATERRA-MS	State Institute for Agrarian Development, Technical Assistance and Rural Extension (MS)
IDB	Inter American Development
IPEA	National Institute of Economic and Social Planning
LPM	Local Project Manager
M&E	Monitoring and Evaluation
MAA	Ministry of Agriculture and Supply
MCT	Ministry of Science and Technology
MPO	Ministry of Planning and Budget
MS	State of Mato Grosso do Sul
MSP	Medium-Size Project
NEP	National Environmental Management Project
NGO	Non-Governmental Organization
OAS	Organization of American States
OP	Operational Program
PAs	Protected Areas
PC	Project Co-ordinator
PCBAP	Upper Paraguay River Basin Conservation Program
PDC	Project Deliberative Committee
PNMA	National Environment Program
PPAs	Private Protected Areas
PRODEAGRO	Mato Grosso: Natural Resources Management Project
PRONABIO	National Program for Biological Diversity
PRODETAB	Agricultural Technology Development Project for Brazil/AGTEC
RJ	State of Rio de Janeiro
SEAIN	Secretariat of International Affairs (under MPO)
SEMA	State Secretariat for the Environment (MS)
SEPROD	State Secretariat for Production (MS)
TEC	Technical Executive Committee
UFMS	Federal University of Mato Grosso do Sul
USAID	The United States Agency for International Development
WWF	World Wildlife Fund

PROJECT SUMMARY

PROJECT IDENTIFIERS	
1. Project name: Formoso River: Integrated Watershed Management and Protection	2. GEF Implementing Agency: World Bank
3. Country or countries in which the project is being implemented: Brazil; State of Mato Grosso do Sul, Municipality of Bonito, Formoso Watershed, Miranda River Basin, Pantanal Region	4. Country eligibility: Brazil ratified the Convention on Biological Diversity on February 28, 1994.
5. GEF focal area: Biodiversity	6. Operational program/Short-term measure: OP#3 and OP#2.
<p>7. Project linkage to national priorities, action plans, and programs:</p> <p>Conservation and the sustainable use of biological diversity through sustainable land management, is a national priority in Brazil, the first country to sign the Convention on Biological Diversity (CBD) in 1992, later ratifying it in 1994. Brazil also ratified CITES in 1975, and the Ramsar Convention on Wetlands in 1993. To demonstrate the country's commitment to conservation of biodiversity and thus the achievement of these national priorities, the Government of Brazil (GOB) has formulated and is in the process of implementing a number of initiatives through a programmatic approach. Among these initiatives, the following major concrete actions should be pointed out at national level:</p> <p>(i) the establishment of the National Program for Biological Diversity (PRONABIO), which promotes partnerships between Government and society in the conservation of biodiversity, the sustainable use of its resources, and the sharing of the resulting benefits derived from such an approach;</p> <p>(ii) the implementation of the GEF-supported National Biodiversity Project (PROBIO), which supports the above-mentioned PRONABIO by identifying priority actions, stimulating partnerships, and disseminating information on biodiversity. The identification of priority actions is occurring through, among other activities, a series of biome-level assessments and workshops;</p> <p>(iii) The creation of the Brazilian Biodiversity Fund (FUNBIO), which was established with an initial capitalization of US\$20 million provided by the GEF, but complemented with contributions from the private sector as well as other interests. It provides long-term support for projects on the conservation and sustainable use of biodiversity;</p> <p>(iv) The formulation of a National Strategy for Biological Diversity, expected to be completed by December 2000. This strategy will analyze current available information, identify objectives and targets for conservation, as well as gaps, opportunities and impacts, proposing the necessary actions and investments to achieve those objectives. One of the goals of the National Strategy is to design a development model that assures the sustainable use of biodiversity; and</p> <p>(v) Wide support for biodiversity research and conservation through a number of government programs, including the National Environment Fund (FNMA), the National Environment Program (PNMA), and the Pilot Program for the Conservation of Tropical Rain Forests (PPG-7).</p> <p>One workshop supported under the aforementioned PROBIO addressed the priority actions for biodiversity conservation of the Pantanal¹, and highlighted the Formoso Watershed, located in the headwaters of the Brazil's Pantanal, as one of the priority areas for the establishment of an ecological corridor. In addition, the Bodoquena Mountain, where the headwaters of the Formoso river and a National Park are situated, was identified in the aforementioned workshop as a priority area for the conservation of the diversity of aquatic life, mammals, plants, and birds. In addition, the Formoso Watershed, located in the Municipality of Bonito, is of particular interest in view of its pristine aquatic environment, which is unique if compared to other aquatic environments of the Pantanal.</p>	

¹ The Pantanal is the largest permanent freshwater wetland in the Western Hemisphere and is classified as globally outstanding in view of its biological distinctiveness.

A final point to be stressed is related to national priorities on stakeholders' involvement in conservation-related activities: according to the first national report for the Convention on Biological Diversity (1998), decision-making for concrete action in biomes such as the Pantanal requires the evaluation of innumerable variables, including local involvement of the community, local physical conditions, and limitations in the infrastructure available.

The proposed project is directly related to the above priorities and actions, as it would promote the strengthening of local environmental and agricultural institutions and communities, by improving participatory planning tools for sustainable use of land and biodiversity and by developing alternative livelihood options for the rural population. It would also support natural habitat rehabilitation and promote an effective management of existing private protected areas, connecting them to different categories of public conservation units occurring in the Formoso watershed.

At the state level, the Government of Mato Grosso do Sul (GoMS) is committed to the conservation and sustainable use of biological diversity. It is currently in the process of initiating the implementation of the Program for the Sustainable Development of the Pantanal (financed by the Inter-American Development Bank - IDB), which aims at the sustainable development of the Upper Paraguay watershed where the Formoso Watershed is located. The proposed project in Bonito is strongly linked to the IDB Program, which includes several activities that are directly relevant as a baseline to the proposed GEF alternative.

The GoMS is also in the process of implementing the Federal Water Resources Law 9433/97, which will provide effective instruments to control and mitigate land and water management practices that degrade water quality, modify hydrological and hydraulic characteristics of the basins, and/or adversely affect the biodiversity of the Pantanal and the Upper Paraguay River Basin. This law calls for the establishment of watershed committees to implement the water policies. The participatory approach of the proposed project in Bonito is consistent with the framework and objectives of the water resources management policy being formulated by the GoMS.

8. GEF national operational focal point and date of country endorsement:

SEAIN/MPO (Ministry of Planning and Budget). Project endorsed by SEAIN in a letter to the World Bank dated October 18, 2001.

PROJECT OBJECTIVES AND ACTIVITIES

9. Project rationale and objectives:

Rationale

The Pantanal is the largest permanent freshwater wetland system in the Western Hemisphere. The system includes some of the largest and most spectacular concentrations of wildlife in the Neotropics, and including upland drainage that extends into Brazil, Bolivia and Paraguay. The Pantanal is an ecoregion of highest priority for conservation at the regional scale due to its globally outstanding biological distinctiveness and vulnerable conservation status.¹ Large areas of the river basins draining into the wetlands² are facing severe environmental problems including deforestation, erosion and excessive sedimentation caused mainly by agricultural expansion and unsustainable agricultural practices.

The proposed Formoso River: Integrated Watershed Management and Protection is located in the Municipality of Bonito, situated in the southern part of the State of Mato Grosso do Sul, at the headwaters of the Miranda River. The Formoso Watershed is considered a unique hydrologic system and a major contributor to the Miranda sub-basin. The upper/middle sections of the Formoso River are of particular interest as they represent a source of pristine and clear water, which feeds the aquatic environments of the Pantanal (see Figures 1 and 2). Moreover, although most of the native vegetation in the middle/lower

¹ *A Conservation Assessment of Terrestrial Ecoregions of LAC* (World Bank/WWF, 1995) and *Freshwater Biodiversity of Latin America and the Caribbean* (WWF / USAID / Biodiversity Support Program / Wetlands International, 1998).

² The Pantanal drains the Cuiabá, Taquari, Miranda, Negro, and Apa catchment areas.

valleys have already been deforested, the remaining areas represent one of the finest examples of primary forests remaining in the Brazilian Atlantic Forest region (particularly on Bodoquena Mountain), as well as of native grasslands and savannah forests that have a relatively stable or intact conservation status (the savannahs of Bonito are considered part of the *Cerrado* biome, another vulnerable and globally outstanding ecoregion)¹.

The Formoso watershed faces growing pressure from human activities. The main threats to the area's ecological integrity are non-sustainable agricultural practices that lead to habitat destruction, erosion and sedimentation of downstream aquatic environments. The selection of the project area was based on three criteria: 1) the results of the *Pantanal* workshop supported under the PROBIO, which considered the Formoso area as a national priority for conservation and sustainable use of biodiversity, based on the criteria of species richness, endemism and uniqueness and rarity of major habitat types, 2) its characteristics of pristine and clear waters, as well as remaining primary forests; and 3) the nature and magnitude of threats to the area's biodiversity resulting from the aforementioned activities including ecotourism, which it shares with other parts of the Pantanal for which the planning and management model to be developed could also act as a model.

GoMS, through SEMA, has supported a series of conservation, environmental monitoring and enforcement activities in the project area. SEMA is also initiating the implementation of an IDB-financed Program for the Sustainable Development of the Pantanal, which aims at the sustainable development of the Upper Paraguay River Basin, where the Formoso Watershed is located. The IDB Program's central objective is to contribute to the protection of the natural resources of the Pantanal, improving its environmental services and leading to sustainable development of the region. The emphasis of IDB interventions will be on those watersheds, which already face severe degradation. The proposed project in the Formoso Watershed is strongly linked to the IDB Program, which includes several baseline activities for the proposed GEF alternative. The proposed project would be complementary to the IDB Program in that it would prioritize the upper/middle sections of the Formoso watershed (targeting approximately 33,000 ha), which still represent a source of pristine and clear waters feeding the aquatic environment of the Pantanal, but which are under threat of degradation unless urgent action is taken to safeguard the pristine conditions. The total area of the entire Formoso Watershed is approximately 133,400 ha.

Despite these efforts, much remains to be done to ensure adequate protection and conservation of the watershed's biodiversity, and to arrest and reverse land degradation in the Formoso watershed in close collaboration with local communities. In light of the significance of the area for the conservation of biodiversity on a global scale, a GEF-supported project is warranted. The project would include activities that complement rather than substitute ongoing government and project initiatives and target the generation of global environmental benefits that are not attained under the existing scenario.

Goal

The **goal** of the proposed project is to contribute to the conservation and sustainable use of biodiversity of global importance, and to promote the control of land degradation in the Formoso Watershed. This would be achieved by directly addressing the identified threats to the watershed's biodiversity. The project's interventions would be focused on the upper/middle sections of the Formoso watershed and would promote increased public engagement, through building of public awareness, involvement, and education. The project would benefit about 150 farmers with holdings of less than 100 ha and other key stakeholders in the Formoso Watershed (local tourism agents, guides, entrepreneurs, artisans, Bonito citizens, state and municipal environmental and agricultural officers working in the Formoso watershed, etc.). The main source of income to those farmers is livestock, followed by crop-based agriculture.

Objectives:

The specific **objectives** of the proposed project are to:

- (i) Promote the strengthening of local environmental and agricultural institutions and communities, by providing them with land-use planning tools for the

Indicators:

- (i) A management plan for the upper/middle Formoso Watershed prepared with the involvement of stakeholders, and biodiversity management

¹ A Conservation Assessment of Terrestrial Ecoregions of LAC (World Bank/WWF, 1995).

<p>formulation and initial implementation of an integrated watershed management plan;</p> <p>(ii) Promote the integrated management of existing public and private protected areas;</p> <p>(iii) Support the implementation of sustainable livelihood activities on a pilot and demonstrative basis that would serve to reduce pressure on key natural resources, and rehabilitate natural habitats, particularly riparian and savannah-like vegetation</p>	<p>capacity and involvement of private sector, institutions, and local communities improved. in</p> <p>(ii) A strategy for the integrated management of protected areas in the Formoso watershed prepared with the involvement of local stakeholders, and its results incorporated into the aforementioned watershed management plan</p> <p>(iii) Two to three selected pilot and demonstrative sustainable activities implemented in the middle/upper Formoso watershed</p>
<p>10. Project outcomes:</p> <p>A) An integrated watershed management plan developed with stakeholders for the entire Formoso watershed, complemented by the development and initial implementation of two detailed plans for critical micro-watersheds, and with inputs from a project-supported strategy for the integrated management of protected areas, and an improved/harmonized regulatory framework</p> <p>B) Sustainable development and integrated ecosystem management training and education program for community members developed and implemented, and project staff from relevant agencies trained to integrate biodiversity management concepts into their routine</p> <p>C) Pilot sustainable economic activities implemented and results disseminated, to serve as a model for reducing pressure on key natural resources</p> <p>D) Participatory project management structure established and functioning, lessons learned, and watershed management model disseminated to other parts of the region (Paraguay, Paraná, and Plata Watersheds).</p> <p>E) Monitoring and evaluation program established and project dissemination strategy finalized and implemented.</p>	<p>Indicators (see additional indicators in the attached Logframe):</p> <p>A) Management plans written and approved by local communities, private sector and the Project Deliberative Committee</p> <p>B) A minimum of 150 community leaders, farmers' representatives and staff of relevant agencies trained to apply land-use planning tools, as well as to apply ecosystem management practices and sustainable activities</p> <p>C) Two to three selected pilot economic activities implemented in the middle/upper Formoso Watershed</p> <p>D) Publication of a document summarizing lessons learned and discussion of this document at a regional-level seminar</p> <p>E) Natural physical resources, socio-economics, and biodiversity baseline data collected and analyzed. Key impact indicators (landscape, water, soil, biological, socio-economic, participation, and regulatory) monitored annually; project results documented and disseminated locally, nationally, and internationally</p>

<p>11. Project activities to achieve outcomes (for details, see description of components and activities in Section D of Project Description, and indicators for each activity in project's logical framework, Annex A):</p> <p>Component 1: Participatory planning and management for the conservation and sustainable use of biodiversity</p> <p><u>Activity 1.1.</u> Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso Watershed.</p> <ul style="list-style-type: none"> • Sub-activity 1.1.1. Formulation of the Formoso watershed management plan • Sub-activity 1.1.2. Formulation of a strategy for integrated management of protected areas • Sub-activity 1.1.3. Formulation of detailed watershed management plans for two critical micro-watersheds • Sub-activity 1.1.4. Harmonization of existing regulatory framework for integrated watershed management and biodiversity conservation <p><u>Activity 1.2.</u> Environmental education and community participation</p>	<p>Input/Output Indicators:</p> <p>1.1.1. Formoso watershed management plan formulated with appropriate community participation, and endorsed by the Project Deliberative Committee and other relevant local stakeholders</p> <p>1.1.2. Strategy for integrated management of protected areas formulated and endorsed by the Project Deliberative Committee and other relevant local stakeholders, and partially implemented in one or more pilot areas of corridors that would connect existing public and private protected areas (affecting approximately 9,500 ha of protected areas)</p> <p>1.1.3. Two detailed management plans for critical micro-watersheds (approximately 9,000 ha located in upper/middle sections of the watershed) formulated and approved by community members</p> <p>1.1.4. Regulatory measures drafted to incorporate biodiversity conservation and integrated watershed management concepts</p> <p>1.2. Six courses and participatory workshops implemented during the first 30 months, directed to community awareness providers (community leaders, school teachers, and tourism guides), with the participation of at least 180 local people</p>
<p>Component 2: Development of sustainable activities in pilot areas</p> <p><u>Activity 2.1.</u> Development of alternative activities based upon the sustainable use and management of natural resources</p> <ul style="list-style-type: none"> • Sub-activity 2.1.1. Implementation of the Support Center for Rural Activities and Agricultural Production • Sub-activity 2.1.2. Transformation and use of organic solid residues • Sub-activity 2.1.3. Development of pilot units of multifunctional land use <p><u>Activity 2.2.</u> Capacity building and training in conservation and sustainable use of biological resources.</p>	<p>2.1.1. The Support Center for Rural Activities and Agricultural Production established and implemented</p> <p>2.1.2. Organic solid residues collected in Bonito and analyzed periodically; a 30% increase in the adoption of organic farming in the region's subsistence crops</p> <p>2.1.3. Two to three sustainable activities implemented in model farms located in critical micro-watersheds during the first 36 months of the project</p> <p>2.2. Six seminars implemented during the first 18 months, directed to at least 50 project participants, including executing agencies staff, community leaders and small farmers; at least 6 field courses on alternative sustainable activities held on model farms; at least 150 farmers trained in biodiversity conservation and integrated watershed management.</p>

<p>Component 3: Project Management, Monitoring and Evaluation and Information Dissemination</p> <p><u>Activity 3.1.</u> Participatory project management and organization:</p> <p><u>Activity 3.2.</u> Project Inputs and Output Monitoring System</p> <p><u>Activity 3.3.</u> Project Impact Monitoring System</p> <ul style="list-style-type: none"> • Sub-activity 3.3.1. Monitoring of soil and water indicators • Sub-activity 3.3.2. Monitoring of terrestrial biodiversity indicators • Sub-activity 3.3.3. Monitoring of social and economic indicators <p><u>Activity 3.4.</u> Project Outreach and Information Dissemination</p>	<p>3.1. The Project Deliberative Committee (PDC) and Technical Unit established and implemented</p> <p>3.2. Project reports prepared by the Technical Project Coordinator/Project Manager and analyzed by the PDC annually, and upon completion of the project</p> <p>3.3.1. Soil biological, chemical and physical indicators evaluated before, during and after implementation of pilot sustainable activities; monitoring results published in bulletins and available on the project website</p> <p>3.3.2. Bird diversity and vegetation cover evaluated before and after implementation of pilot sustainable activities; monitoring results published in bulletins and available on the project website</p> <p>3.3.3. Simulations of profit margins carried out in model farms where pilot activities will be implemented, and socio-economic data of properties surveyed during the PDF-A phase updated upon completion of the project; questionnaires applied to evaluate changes in environmental perception of land users</p> <p>3.4. Project website developed; Project initiatives, results and impacts disseminated through the project website, newsletters, bulletins and workshops</p>
<p>12. Estimated budget (in US\$ or local currency):</p> <p>Preparation: GEF Block A: US\$ 25,000 Co-financing:: US\$ 25,000 Total Preparation: US\$ 50,000 Implementation: GEF MSP: US \$-974,910 Co-financing: US\$ 1, 176,781 TOTAL Implementation: US\$ 2,151,691 TOTAL GEF (PDF+MSP): US\$ 999,910</p>	

INFORMATION ON INSTITUTION SUBMITTING PROJECT BRIEF

13. Information on project proposer:

The project proposer is Embrapa Soils, a thematic research center of the Brazilian Agricultural Research Corporation (Embrapa), and an international reference for soil science, particularly in the study of tropical and sub-tropical soils.

Embrapa Soils' mission is to generate, adapt, promote, systematize, and transfer scientific and technological knowledge on soil genesis, attributes, and processes, as well as land use assessment and planning, aiming at sustainable agricultural development. It associates with public and private organizations in order to meet their demands for knowledge on natural resources (soil, water and biodiversity) and their technological needs to achieve sustainable development of agriculture, integrated with maintenance of environmental quality and conservation of biodiversity.

In the past 25 years, Embrapa Soils has developed relevant activities and programs directed to the protection of the most important and fragile ecological systems and biomes of the country. The following are the most relevant activities to this proposal:

- Development of a community level decision support system for monitoring environmental impacts in the upper Taquari basin, part of the Pantanal eco-region (financed by World Bank – AGTEC Loan)
- Studies on organic matter dynamics and pedological attributes of Oxisols (Ferrasols) under sustainable management systems (zero tillage) in the Cerrado region (financed by Embrapa).
- Adaptation and development of modern tools of precision agriculture directed towards the sustainable land use and management of tropical and sub-tropical regions (financed by Embrapa and the World Bank/AGTEC Loan)

Development of geographic information systems for environmental planning of rural and urban areas in São Miguel do Oeste MS (financed by Embrapa)

14. Information on proposed executing agency:

Same as above (Section 13).

14a. Information on proposed co-executing agency:

The project proponent Fundação André Tosello (FAT) is a private, non-profit foundation, established in 1971. Its mission is to promote scientific and technological research for sustainable development in Brazil, disseminate information to academia, industry, government and to the public in general, as well as training of human resources in strategic areas for the country. Since its creation, (FAT) is involved in conducting and/or managing research projects and training activities, including workshops, training courses, scientific and technical meetings, in several themes relevant for the development of know-how and research in biodiversity, biotechnology and sustainable development in Brazil.

The (FAT) is currently actively engaged in collaborative projects with other partner institutions in Brazil in the areas of industrial and environmental microbiology, databases for biodiversity and conservation and, more recently, activities related to sustainable development and environmental education, with support from grant agencies in Brazil (e.g., FAPESP, State of São Paulo Research Foundation, CNPq, the Brazilian National Research Council, and the Ministry of Science and Technology, MCT) and abroad (GEF-Global Environment Facilities, National Science Foundation/USA and World Bank). Amongst other projects FAT has the responsibility to execute and manage the finances of a GEF project linked to the Ministry of Environment of Brazil. Additional information may be obtained by accessing the Internet site of FAT at <http://www.fat.org.br>.

15. Date of initial submission of project concept: October 9, 1998

INFORMATION TO BE COMPLETED BY IMPLEMENTING AGENCY:

16. Project identification number: P066536

17. Implementing Agency contact person:

Karin Shepardson, Global Environment Coordinator: Tel: 202 473-8954; email kshepardson@worldbank.org

Graciela Lituma, Task Manager, Latin America and Caribbean Region : Tel: 202 473-4731892; email glituma@worldbank.org

18. Project linkage to Implementing Agency program(s):

(a) Linkage to World Bank Programs: The most recent (May 2001) Brazil Country Assistance Strategy (CAS) identifies the need to implement solutions that require a combination of protection of priority ecosystems with balanced measures to reduce poverty and develop sustainable alternatives for increasing the income of the local population. The same report states that the Brazilian Government has informed the Bank that it would like to prepare GEF projects to protect three of the country's major biomes, including the Pantanal. The CAS also states that helping Government decentralize environmental policy and support local constituencies is an important part of the Bank's long-term environmental strategy. In addition, the CAS proposal of options for an expanded environmental assistance program includes, among other things, possible programs to support sustainable activities that increase the income of the local populations who live close to important native vegetation areas not yet subjected to heavy deforestation pressures. The Formoso River watershed area falls within the latter category. The proposed GEF medium-sized project will benefit from and complement the institutional strengthening work to be undertaken by the Mato Grosso do Sul State Government under the recently approved World Bank-financed Second National Environment Project. It will also complement the "Integrated Management of Freshwater Biodiversity and Water Resources in the Amazon" project proposed for GEF funding, which will focus in part on microwatershed management along the Xingu River in Mato Grosso do Sul.

(b) Linkage to Other Agency Programs: The proposed project relates to a GEF project implemented through the UNEP, co-financed by OAS, and executed by the Ministry of Environment, Water Resources and Legal Amazon (MMA) and by the State Governments of Mato Grosso and Mato Grosso do Sul. It is a large-scale project entitled "Integrated Watershed Management Program for the Pantanal and Upper Paraguay River Basin." Its main objective is to catalyze the preparation and implementation of a watershed management program for the Pantanal and the Upper Paraguay River Basin. Project activities will enhance and restore the environmental functioning of the system, provide protection to endemic species within the wetlands; and implement strategic activities to address the root causes of degradation identified in the World Bank-financed PCBAP program. Actions under this project will complement basin-scale interventions by the Government of Brazil, financed from national and state sources and by international funding, and sub-basin scale activities conducted under the World Bank-UNDP PRODEAGRO program. Major activities under this project focus on the control of land degradation in the headwaters of the Taquari sub-basin, and monitoring the effects of land and water management activities on soil loss and sediment transport.

The proposed project will also coordinate with other proposed international organizations' efforts focused on the Pantanal, including the proposed "Pantanal: Ecosystem Management of a Major Center of Wetland Biodiversity Project," which currently has a concept note in the GEF pipeline (UNDP as Implementing Agency). This preparation project will design a project proposal for future funding that will present an ecosystem approach to integrating biodiversity conservation within sound development in the Pantanal region. The proposed project also complements the IDB-financed "Program for the Sustainable Development of the Pantanal," which focuses on already degraded watershed areas; while the proposed project would prioritize the more pristine upper/middle sections of the Formoso watershed, which still represent a source of pristine and clear waters feeding the aquatic environment of the Pantanal.

I. DETAILED PROJECT DESCRIPTION

A. PROJECT RATIONALE AND OBJECTIVES

The Pantanal is the largest, permanent freshwater wetland system in the Western Hemisphere. The system includes some of the largest and most spectacular concentrations of wildlife in the Neo-tropics and is probably South America's most important wetland. Including upland drainage, it extends into Brazil, Bolivia and Paraguay. In Brazil, the Pantanal covers about 140,000 km² and drains the Cuiabá, Taquari, Miranda, Negro, and Apa catchment areas, all tributaries of the Paraguay River which in total encompasses a geographic area of about 360,000 km², distributed between the Brazilian States of Mato Grosso and Mato Grosso do Sul (see Figure 1).

The Pantanal is comprised of a mosaic of flooded grasslands and savannahs, riparian forests, and dry forests. Seasonal fluctuations of the water level¹ create a complex system of temporary pools and channels, which, together with the permanent pools and ponds on high grounds, contain rich aquatic fauna, including about 260 fish and 700 bird species (identified). Other major components of aquatic fauna are reptiles, amphibians, mammals and aquatic invertebrates. In addition, the Pantanal provides protection to numerous threatened fauna species such as swamp deer, bush dog, giant river otter, jaguar and the hyacinth macaw. According to the results of two studies on the conservation assessment of terrestrial² and freshwater³ ecoregions of Latin America and the Caribbean (LAC), the Pantanal is an ecoregion of highest priority for conservation at the regional scale due to its globally outstanding biological distinctiveness and vulnerable conservation status. In Brazil, the Pantanal is a national priority, a statement that is stressed in the major national policy documents and also in the first national report for the Convention on Biological Diversity (1998).

Despite the system being renowned as a globally outstanding ecoregion, large areas of the aforementioned river basins draining into the wetlands are facing severe environmental problems. Deforestation, erosion and excessive sedimentation caused mainly by agricultural expansion and unsustainable agricultural practices are the most severe threats to the Pantanal's ecological integrity. Charcoal production, gold mining, water projects, pollution, road construction, and impoverishment of the rural population pose additional environmental threats over the next decade.

The proposed Formoso River: Integrated Watershed Management and Protection is located at the headwaters of the Miranda River. The Formoso drainage area covers 130,000 ha, and is part of the Bodoquena Mountain Complex (Municipality of Bonito, State of Mato Grosso do Sul). The Formoso watershed constitutes a unique hydrologic system associated with calcareous rocks, and includes subterranean rivers, gutters (escape holes) and resurgences (see Figure 2).

The upper/middle sections of the Formoso River are of particular interest as they represent a source of pristine and clear water, which feed the aquatic environments of the Pantanal. These headwaters are protected by the recently created Serra da Bodoquena National Park, which comprises a total of 76,400 hectares divided into two non-contiguous parts. The southern part contains the headwaters of the Perdido and Formoso Rivers. About 4,000 ha of the Park are located in the Formoso River watershed, which corresponds to about 5% of the Park's area, while 3% of the Formoso River watershed is located inside Park's boundaries. The Serra da Bodoquena National Park contains the last conserved remnants of interior Atlantic Forests (Brazilian biome with only 7% of its primary forests remaining and considered by a report published by *Conservation International*⁴ to be one of the

¹ During the rainy season over 80 percent of the region floods.

² A Conservation Assessment of Terrestrial Ecoregions of LAC (World Bank/WWF, 1995).

³ Source: Freshwater Biodiversity of Latin America and the Caribbean (WWF / USAID / Biodiversity Support Program / Wetlands International, 1998).

⁴ Source: Hotspots (edited by Norman Myers, Russell A. Mittermeier, Cristina G. Mittermeier, Gustavo A.B. da Fonseca and Jennifer Kent, *Conservation International*, 2000).

five global priorities in terms of biodiversity protection), and is refuge to endangered species, such as the jaguar (*Panthera onca*) and harpy eagle (*Harpia harpyaja*).

Although most of the native vegetation in the middle/lower sections of the Formoso River watershed has already been deforested, the remaining areas with natural vegetation cover represent the finest examples of primary forests as well as of native grasslands and savannah forests that have a relatively stable or intact conservation status (the savannahs of Bonito are considered part of the *Cerrado* biome, another vulnerable and globally outstanding ecoregion)¹.

Despite its global significance, the Formoso watershed faces growing pressure from human activities. The main threats to the area's ecological integrity are non-sustainable agricultural practices that lead to habitat destruction, erosion and sedimentation of downstream aquatic environments. They include: (i) increasing pressure to convert natural habitats into grazing lands (livestock); (ii) destruction of riparian forests (through burning and logging); (iii) overgrazing by livestock; and (iv) unsustainable agricultural practices. Additional threats are associated with an increasing tourism industry that places great pressure particularly on the remnants of riparian forests, and impoverishment of the local population.

The selection of the project area (the Formoso Watershed) was based on three criteria:

- the results of the previously mentioned *Pantanal* workshop supported under the PROBIO, which considered the Formoso area as a national priority for conservation and sustainable use of biodiversity. The principal workshop criteria for setting conservation priorities were (a) species richness; (b) endemism; and (c) uniqueness and rarity of major habitat types and unusual ecological or evolutionary phenomena;
- its characteristics of pristine and clear waters, as well as primary forests, native grasslands and savannahs in good conservation status; and
- the nature and magnitude of threats to the area's biodiversity resulting from the aforementioned agricultural activities, issues that are major problems in other areas of the Pantanal as well. Consequently, the planning and management model to be developed under the proposed project could be further expanded to other parts of the Pantanal where similar agricultural activities pose a threat to its integrity.

In an initial attempt to address major environmental issues and threats to the biodiversity characteristics in the project area, the GoMS, through its environmental agency (SEMA), has supported a series of conservation, environmental monitoring and enforcement activities.

In addition, SEMA is currently in the process of initiating the implementation of the Program for the Sustainable Development of the Pantanal (financed by the Inter-American Development Bank - IDB), which aims at the sustainable development of the Upper Paraguay River Basin where the Formoso Watershed is located. The IDB Program's central objective is to contribute to the protection of the natural resources of the Pantanal, improving its environmental services and leading to the sustainable development of the region. The most important criteria used to select priority watersheds for intervention under the IDB Program was the degree of land and water degradation. The aforementioned highly degraded Taquari River is a major priority area. The improvement of water supply and sanitation in a number of urban areas of the Pantanal region is also a major priority for this Program (22 municipalities will receive support for water supply systems, 15 for wastewater systems, and 10 for solid waste treatment and disposal). The proposed project is strongly linked to the IDB Program, which includes several activities directly relevant as a baseline to the proposed GEF alternative. The proposed project would be complementary to the IDB Program in the sense that it would place priority on the upper/middle sections of the Formoso watershed that, although starting to

¹ A Conservation Assessment of Terrestrial Ecoregions of LAC (World Bank/WWF, 1995).

face growing pressure from human activities, still represent a source of pristine and clear waters that feed the aquatic environments of the Pantanal. The IDB Program focuses on the more degraded and immediately threatened parts of the Formoso Watershed, and would not specifically address the requirements for diversification in the upper and middle portions of the watershed, which are threatened with degradation unless action is taken to safeguard the pristine conditions.

The GoMS is also in the process of implementing the Federal Water Resources Law 9433/97, which will provide effective instruments, including the establishment of watershed committees with full representation of the civil society, to control and mitigate land and water management practices that degrade water quality, modify hydrological and hydraulic characteristics of the basins, and/or adversely affect the biodiversity of the Pantanal and the Upper Paraguay River Basin. This law also calls for the establishment of watershed committees. The participatory approach of the proposed watershed-focused project in Bonito is consistent with the framework and objectives of the Brazilian water resources management policy and will facilitate the implementation of the water policies being formulated by the GoMS.

Despite these efforts, much remains to be done to ensure adequate protection and conservation of the watershed's biodiversity, and arrest and reverse land degradation in the Formoso watershed in close collaboration with local communities. In light of the significance of the area for the conservation of biodiversity of global importance, a GEF-supported project is warranted. It would include activities that complement rather than substitute ongoing government and project initiatives and target the generation of global environmental benefits which are not envisaged under the existing scenario.

The goal of the proposed project is to contribute to the conservation and sustainable use of biodiversity of global importance, including agrobiodiversity, and to promote the control of land and water degradation in the Formoso Watershed. This would be achieved by directly addressing the identified threats to the watershed's biodiversity. The project's interventions would be focused on the upper/middle sections of the Formoso watershed and would support increased public support, through public awareness, involvement, and education. The project would benefit about 150 farmers with holdings of less than 100 ha and other key stakeholders in the Formoso Watershed (local tourism agents, guides, and entrepreneurs, artisans, Bonito citizens, state and municipal environmental and agricultural officers working in the Formoso Watershed, etc.). The main source of income to these farmers is livestock, followed by crop-based agriculture.

The specific objectives of the proposed project are to: (i) promote the strengthening of local environmental and agricultural institutions and communities, by providing them with land-use planning tools for the formulation and initial implementation of an integrated watershed management plan; (ii) promote the integrated management of existing public and private protected areas; and (iii) support the implementation of sustainable activities on a pilot and demonstrative basis that would serve to reduce pressure on key natural resources, and rehabilitate natural habitats, particularly riparian forests, native grasslands and savannahs.

B. CURRENT SITUATION: *Baseline Course of Action*

Past project-related activities

Environmental law enforcement in Brazil is the responsibility of IBAMA (Brazilian Institute for the Environment and Renewable Natural Resources), which is an organization under the Ministry of Environment. IBAMA is also responsible for implementing and managing the Brazilian System of Conservation Units, and therefore will be in charge of implementing the Serra da Bodoquena National Park and guaranteeing its integrity.

Environmental management in Mato Grosso do Sul is the responsibility of the State Secretariat of the Environment (SEMA), created in 1991. Particularly in the last 5 years, SEMA has been carrying out a

number of activities in the Formoso Watershed that provide the basis for environmental management which determines the major course of action. SEMA oversees the work of the *Fundação Estadual de Meio Ambiente - Pantanal (FEMAP)*, which is the technical arm of SEMA in the Pantanal region. The State Forestry Police also plays a major role in the enforcement of national and state forest legislation, and in the control of poaching. Also at state level, the State Institute for Agrarian Development Technical Assistance and Rural Extension (IDATERRA), former State Agricultural Research and Rural Extension Enterprise (EMPAER), executes a number of relevant activities in the project area that create the opportunity for improving rural people's livelihoods while, at the same time, conserving natural resources and the environment.

The Brazilian Agricultural Research Corporation (Embrapa), linked to the Ministry of Agriculture and Food Supply, has the responsibility to provide feasible solutions for the sustainable development of Brazilian agribusiness by generating, adapting and transferring knowledge and technology that benefit Brazilian society. Networking through 37 research units, Embrapa is present in almost all Brazilian states. In the Pantanal and its surroundings within the State of Mato Grosso do Sul (State of MS), it has three research centers: (1) Embrapa Pantanal which, for 24 years, has been studying this complex ecosystem and striving to promote sustainable development of the region; (2) Embrapa Western Agriculture, a regional research unit working on low-cost development of production systems that are environmentally safe, and with research facilities that include, among other things, laboratories and a geoprocessing station for environmental monitoring; and (3) Embrapa Beef Cattle, working as a priority on increasing yields and efficiency of livestock systems, and with a major research area on recovery of degraded pastures, an important issue in the context of the proposed GEF project. In addition to these three units located in the Pantanal region, the Embrapa Soils Unit, with headquarters in Rio de Janeiro, has also developed relevant activities and programs directed at the protection of the Pantanal, including the first soil maps of Mato Grosso do Sul during the early seventies, and land use planning of northern Pantanal (Poconé and Cáceres region) in the early eighties.

Selected past and on-going activities related to natural resource management and sustainable agriculture are presented below in key areas relevant to the project:

1) Participatory planning and management for the conservation and sustainable use of biodiversity

The GoB created by decree the Serra da Bodoquena National Park, encompassing 76,400 ha of the mountain range that represents the "meeting point" of four globally important biomes in terms of their biodiversity: Pantanal, Cerrado, Chaco, and Atlantic Forest. The proposed Park contains the headwaters of the Formoso River, with 3% of the Formoso Watershed included inside its boundaries. IBAMA is in charge of its implementation, which will include the formulation of a Management Plan for the National Park in a period of 5 years counting from September 2000.

In the last 10-15 years, Embrapa has played a key role in the implementation of target research needed for planning and management for conservation and sustainable use of biodiversity. Embrapa Pantanal has been classifying and mapping the Pantanal vegetation, monitoring the population of wild animals, identifying its fauna and flora, and registering its fish species. In addition, it has identified environmental and socioeconomic impacts in the Taquari River basin, one of the five major basins that form the Pantanal. Embrapa Western Agriculture has produced an agricultural zoning map for the State of MS, carried out monitoring of natural resources in some areas of the Pantanal, and continues to undertake research on recovery of degraded pastures, soil management and agricultural conservation systems suitable for the Pantanal region. Embrapa Soils has developed a community-level decision support system for monitoring environmental impacts in the upper Taquari, one of the five major river basins that form the Pantanal.

As an environmental management agency, SEMA executes the state program of licensing¹, monitoring and enforcement of environmental regulation, and also proposes state environmental regulations that are approved by the State Environmental Council. The major planning activity services provided by SEMA in the project area, where it has a regional office (in Bonito), are the following: (i) environmental licensing of new and existing facilities (about 45 permits have been granted by SEMA within the Formoso watershed, including 18 tourism enterprises and 4 hotels); and (ii) enforcement of state environmental and forest regulations through a systematic program that includes the inspection and monitoring of permit compliance, and the consideration of public complaints about activities with negative environmental impacts. The State Forestry Police also plays a major role in enforcement of national and state forest legislation. SEMA's current administration policy includes the requirements to include in each of its projects stakeholder consultation, community training, instruction and outreach, since environmental education is considered an important management tool. Regarding the regulatory framework, SEMA has proposed some important regulations approved under the State Pollution Activities Licensing System which, where implemented and enforced, have contributed to improved environmental quality. Among the regulations that are relevant to the project area is the norm that controls tourism activities in the State, focusing on nature protection and conservation, and hence providing an important policy instrument that promotes low-impact tourism activities. This regulation is particularly important to the Municipality of Bonito, where an increasing tourism industry (mainly eco-tourism) poses great pressure particularly on the remnants of riparian forests.

2) Development of sustainable activities in pilot areas

Embrapa, through several of its units, including Beef Cattle and Western Agriculture, has carried out research on recovery of degraded pastures and has developed a strategy to validate and disseminate technologies for the recovery and sustainable management of degraded soils in the Cerrado biome (native grasslands and savannah forests of the Formoso watershed are considered part of the *Cerrado* biome). In addition, Embrapa, through its Soils and Western Units, among others, has been actively engaged in research and development of soil conservation strategies in cropping systems, including no-tillage systems and crop rotation schemes.

EMPAER has provided extension assistance to farmers and carried out adaptive research aimed at securing rural people's livelihoods. In the past, most extension work was focused on traditional agriculture, but recently IDATERRA has started to shift its work to sustainable agriculture. Two major ongoing state programs that include the Formoso Watershed are: (i) extension and technical assistance through the Smallholder Sustainable Agriculture Program (*Apoio ao Desenvolvimento Sustentável da Agricultura Familiar*); and (ii) Support Program for Added Value of Small-Scale Farm Products (*Verticalização da Pequena Produção Agropecuária*).

3) Management, Monitoring and Evaluation and Information Dissemination

Embrapa has accumulated more than 30 years of experience in planning activities, research administration, project coordination and execution, and continues to manage international cooperation projects. It coordinates the National Agricultural Research System with cooperating institutions carrying out research in geographical areas or in defined fields of scientific knowledge. Embrapa is responsible for the implementation of the Agricultural Technology Development Project (AGTEC), financed by the World Bank (Loan BR-4169) and consisting of an investment totaling US\$120 million, of which the World Bank loans 50%, directed towards agricultural research, development and

¹ The licensing application, presented either by private or public enterprises, contains information on technical parameters and emissions based upon which SEMA grants or refuses the license, which is renewable every 2 (logging) to 10 (polluting activities) years, depending on the type of license granted (site, installation or operation permit), the characteristics of the enterprise and the magnitude of environmental impacts. For activities with a large environmental degradation potential, the evaluation of an Environmental Impact Analysis (EIA) is included as part of the licensing process.

technological transfer. The nature and objectives of supported projects depend on demands identified in project calls that happen once or twice a year.

Embrapa Soils has extensive experience in multi-institutional Project management. Just to mention the most recent experiences with a stronger relation to the proposed Formoso River: Integrated Watershed Management and Protection Project, Embrapa Soils coordinated two inter-disciplinary and multi-institutional projects in the state of Mato Grosso do Sul: 1) Study of Environmental Quality of Municipalities as a Function of Soil Use: Reference for Territorial Planning and Ordinance (financed by Embrapa); and 2) Decision Support System for Environmental Impact Monitoring of Agricultural Activities in the Upper Taquari Watershed: An Environmental Management Tool for the Municipalities of the Upper Taquari (financed by World Bank/AGTEC, and in its final year of implementation). Elsewhere in Brazil, Embrapa Soils was the principal Brazilian partner and co-manager of an European Union-funded project entitled "Development of Sustainable Farming Systems on Mountainous, Low-Fertility Grazing Land in South America" (contract TS3*-CT94-0315), and coordinates an ongoing World Bank/AGTEC-funded project entitled "Sustainable Systems Applying No-Tillage Practices for the Recovery of Degraded, Mountainous Grazing Land of the Atlantic Forest Biome Located in the Northwest Region of Rio de Janeiro State."

SEMA has accumulated more than 10 years of experience in environmental management, particularly connected to the implementation of the State Pollution Activities Licensing System. SEMA also coordinated the successful implementation of the National Environmental Management Project (NEP I) in the State of MS, supported by the World Bank (Loan 3173-BR), which focused on capacity building and strengthened protection of key endangered ecosystems. Under this project SEMA coordinated the preparation of a macro-plan for the conservation of the Upper Paraguay River Basin (PCBAP). In addition, since 1996, SEMA has been carrying out systematic water quality monitoring activities in a number of rivers, including the Formoso River and three of its tributaries at 10 locations, with the measurement of 18 physical-chemical and bacteriological parameters.

EMPAER has accumulated experience in the administration of the State's regular program on agricultural research and extension. In addition, it has also coordinated and executed the MS State component of the National Microcatchment Program supported by the Federal Government during the eighties. The recently created IDATERRA replaced and inherited the technical staff and experience of EMPAER-MS, and has the official mandate for conducting the State's program on agricultural research and extension.

Ongoing and future project-related activities: Baseline course of action

The major ongoing or future activities planned for implementation in the next 3-4 years are described below. Some will be implemented throughout the State of Mato Grosso do Sul (MS), including the project area, and others will take place either in the Pantanal as a whole (or part of it), or specifically in the Formoso Watershed.

1) Planning and management for the conservation and sustainable use of biodiversity (US\$180,225)

Embrapa and FUNDECT¹ will implement two research projects that will survey the flora species of the State of MS (Flora Project) and the birds and mammals of the Upper Paraguay River basin. Both projects include the headwaters of the Formoso River (Bodoquena Mountain), an area of national priority for biodiversity conservation. They will be financed by the National Council for Scientific and Technological Development. The ongoing Embrapa Soils "Communication for Technological Transfer" project provides the know-how and operational requirements, using state-of-the-art communication techniques for the implementation of capacity-building training programs designed to update and inform farmers, researchers, extension workers and students on technological and information issues of Soil Science and sustainable land use.

¹ Foundation for the Support and Development of Education, Science and Technology of Mato Grosso do Sul.

SEMA's priority for the next few years is the preparation of new regulations to improve the existing State Pollution Activities Licensing System. In addition, SEMA will continue to execute the existing enforcement activities, which are carried out under the regular state environmental management program, by providing staff and contributing to the running costs.

In order to strengthen the implementation and enforcement of environmental regulation in the Formoso watershed, SEMA will structure its regional technical office located in Bonito with vehicles and office equipment, through the institutional strengthening component supported under the IDB-financed Program for the Sustainable Development of the Pantanal (a 5-year project, starting in 2000). The IDB-financed program, through the provision of field equipment, vehicles and training, will also strengthen the State Forestry Police.

To promote the integrated management of protected areas in the Formoso Watershed, SEMA will execute two initiatives under its regular environmental management program that will:

(i) promote the creation of new private protected areas (PPAs) and the effective implementation of existing PPAs. This promotion will be achieved by a) facilitating the application of a state law of incentives (tax relief) to land owners who establish PPAs on their properties; and b) providing technical assistance and guidance for the adoption of compatible uses that safeguard protection of the PPA's biodiversity;

(ii) support the protection and recovery of areas that are protected by Brazilian legislation in view of their environmental sensitivity (such as riparian forests or forests located on steep slopes), although SEMA will continue to execute the existing enforcement program to support this initiative.

To increase the State's interventions on environmental education and to promote community participation, SEMA will implement the "Agents of Environmental Sciences Training Project", financed by GEF (OAS co-financing), with the objective of training school teachers from Bonito and from the outskirts of Bodoquena Mountain, to act as "disseminators" of environmental protection. Training of professional staff and community leaders will not be provided by the above baseline project, however.

The IDB Program will focus on the control of land and water degradation by promoting: a) improved water resources management and increased water users' participation; b) implementation of water supply, sanitation and solid waste processing and disposal units in urban areas of the Pantanal; c) improved extension and environmental services; and d) implementation of sustainable economic activities. It will provide state-level institutional strengthening related to both green and brown environmental issues and to water resources management. The highly degraded Taquari River is a major priority area for this Program. The Miranda River Basin, including the lower section of Formoso Watershed, is also a potential priority area.

2) Development of sustainable activities (US\$406,900)

Embrapa Beef Cattle will continue to carry out research on recovery of degraded pastures and sustainable management of degraded soils, including four on-farm researcher-managed trials in the State of MS. IDATERRA's adaptive research and extension program will continue to support farmers in traditional agriculture but will increase the emphasis on conservation techniques. The IDB-supported Program for the Sustainable Development of the Pantanal will strengthen the existing research and extension services in the Formoso Watershed, assisting 3 micro-watersheds, and providing financial support to individual farmers for conservation farming activities, collective goods and services, such as field machinery, rural mobilization for micro-watershed management and equipment for the IDATERRA office in Bonito. These services will be provided by IDATERRA, and in partnership with the Municipality of Bonito. More specifically, it will include the provision of:

(i) Individual goods and services (limited to US\$3,000/farmer) for the construction of terraces and fences, the purchase of seedlings for the recovery of riparian forests and small-scale commercial forestation, the purchase of green manure seeds, and the supply of water to cattle on grazing lands; (ii) collective goods and services for: purchase of no tillage field machinery, community supply structure for agrochemical sprayers, installation of deposit structures for the disposal of toxic agrochemical recipients, and improvement of internal roads; (iii) rural organization and mobilization directed at the development of micro-catchments; training courses for extension workers and farmers; technical exchanges; production and distribution of technical bibliography; (iv) institutional strengthening through the purchase of vehicles and field equipment for the IDATERRA office in Bonito; and (v) pilot project for the collection, treatment and adequate disposal of solid waste in urban area of Bonito (about 10,000 inhabitants).

These activities will make a valuable contribution to the development of environmentally sustainable livelihood strategies, but they will focus mainly on sustainable production systems with reduced erosion and increased yields rather than biodiversity conservation as a priority livelihood strategy.

3) Management, Monitoring and Evaluation and Information Dissemination (US\$143,472)

Embrapa and FUNDECT¹ will implement the aforementioned research project on the survey of birds and mammals of the Upper Paraguay River basin, including the headwaters of the Formoso River (Bodoquena Mountain). These activities will contribute to improving available information on the status of biodiversity in the watershed by identifying the conditions of some of the target biodiversity at the early stages of project implementation as a necessary benchmark, against which management-induced changes can be identified and measured. SEMA will continue to carry out its systematic water quality-monitoring program on the Formoso River and three of its tributaries.

Despite existing activities and efforts, there remains much to be done to ensure adequate protection and sustainable use of biodiversity, and to prevent land degradation in the Formoso Watershed with the participation and close collaboration of local communities. In the absence of the proposed project, the conservation of natural habitats with relatively stable or intact conservation status will remain largely dependent on the existing state environmental management system which suffers from severe budget constraints and an ineffective legal framework, lack of a strategic plan or an effective management strategy for the conservation and sustainable use of biodiversity. Interventions so far have focused mainly on licensing and enforcement systems, which do not take community participation into consideration and integrated actions at local, state, and federal level will not be optimized in the absence of the proposed project.

C. EXPECTED PROJECT OUTCOMES

The project activities to be carried out over the next four years, are expected to have the following five major outcomes:

A) An integrated watershed management plan developed with stakeholders for the entire Formoso Watershed, complemented by the development and implementation of two detailed plans for critical micro-watersheds, and with inputs from a project-supported strategy for the integrated management of protected areas and an improved regulatory framework.

B) Sustainable development and integrated ecosystem management training and education program for community members developed and implemented, and project staff from relevant agencies trained to integrate biodiversity management concepts into their routine.

¹ Foundation for the Support and Development of Education, Science and Technology of Mato Grosso do Sul.

C) Pilot sustainable activities implemented and results disseminated, to serve as a model for reducing pressure on key natural resources.

D) Participatory project management structure established and functioning, lessons learned, and watershed model disseminated to other parts of the country and internationally.

E) Monitoring and evaluation program established and project dissemination strategy formulated and implemented.

D. ACTIVITIES AND FINANCIAL INPUTS REQUIRED FOR THE PROPOSED MEDIUM-SIZE PROJECT

To achieve the proposed objectives and outcomes, the project would be implemented over a four-year period. It would support the development of a strategy for effectively preserving and restoring terrestrial and aquatic ecosystems characterized by biodiversity of global importance and for securing rural people's sustainable livelihoods. The strategy would include the formulation of an Integrated Management Plan for the entire Formoso Watershed, complemented by the preparation and application of two detailed plans for critical micro-watersheds. As an input to the formulation of the management plan for the Formoso Watershed, a strategic plan for integrated management of protected areas (PAs) of the watershed would also be formulated and partially implemented, aiming at the enhancement of connectivity, through ecological corridors between fragments of the natural vegetation present in the watershed, with the protected Atlantic Forest remnants found in the Serra da Bodoquena National Park. The results and lessons learned from the application of the strategy to the two pilot micro-watersheds and ecological corridors are intended to form the basis for replication in other parts of the Formoso Watershed and even some areas of the larger Pantanal (Upper Paraguay River Basin).

The strategy would have six major principles: (i) targeting of priority biodiversity-related problems; (ii) a high level of stakeholder involvement; (iii) integrated solutions that make use of the expertise and authority of multiple agencies, (iv) federal, state, municipal and grassroots institutional capacity; (v) improving regulatory framework; and (vi) monitoring to measure the project's impact. These principles cut across all project components and activities, as outlined below.

The project would have three components: (1) participatory planning and management for the conservation and sustainable use of biodiversity in the Formoso Watershed; (2) development of sustainable activities in pilot areas; and (3) Project Management, Monitoring and Evaluation and Information Dissemination.

Activities to be carried out within each of the components are described below.

Component 1: Participatory planning and management for the conservation and sustainable use of biodiversity (*Total costs amount to US\$871,673 and associated incremental costs of US\$711,317, of which GEF US\$313,218 and GoB US\$398,099*)

This component will provide the basis for conservation and sustainable use of biodiversity in the Formoso Watershed. This will be achieved by a) developing with stakeholders a management plan for the entire Formoso Watershed, complemented by the development and initial implementation of two detailed plans for critical micro-watersheds, b) promoting integrated management of protected areas, c) supporting environmental education and training in participatory techniques, d) training project staff to integrate biodiversity management concepts into their routine; and e) improving the regulatory framework for biodiversity conservation and enforcement.

Land-use planning tools and approaches for the formulation and initial implementation of the Management Plan will be provided to local environmental and agricultural institutions and communities. These would include mainly GIS methodologies and the engagement of local stakeholders in the analysis of problems and design of solutions to reduce land degradation and

pressure on key natural resources. Activities under this component will be coordinated by SEMA in collaboration with Embrapa Soils.

Activity 1.1 Development of a Watershed Management Plan and Promotion of Integrated Management of Protected Areas in the Formoso Watershed (coordinated by Embrapa Soils)

Sub-activity 1.1.1. Formulation of the Formoso Watershed Management Plan (coordinated by Embrapa Soils)

The formulation of a Management Plan developed with stakeholders for the entire Formoso Watershed would include:

- a) Stock-taking¹ of existing programs (ongoing conservation efforts, environmental permitting, monitoring and enforcement, fish and wildlife, water resources planning, rural extension, social and education programs, etc.);
- b) Assessment¹ and characterization of perceived environmental/biodiversity problems;
- c) Establishment of a GIS database containing both available data as well as additional information generated by targeted surveys on a scale of 1:100.000 (see Annex B for detailed information on data collection and analysis);
- d) A spatial analysis combining physical, biological and human aspects²;
- e) Scenario analysis and GIS user training. Under this activity, multiple land-use scenarios would be created, taking into account the current status of biodiversity and land-use trends, associated with the vulnerability of natural resources and socioeconomic indicators. This stage will require a high level of stakeholder involvement (at state, municipal and grassroots levels), through a series of focus groups and workshops, to define the trends and future prospects of land use and biodiversity conservation. Results from technical studies would be presented and debated with stakeholders during workshops held in Bonito. The scenario analysis would be the basis for the design of the Watershed Management Plan. The GIS users (farmers, municipal leaders, project staff, etc.) would be trained to continuously add data to the system, carry out the spatial analyses and scenario evaluations, contributing therefore to a dynamic management of the watershed;
- f) Final report writing of the management plan following a local consultation workshop. The plan would establish environmental (and particularly biodiversity) objectives that are consistent with Brazilian legislation, World Bank and GEF policies, and would reflect the needs and concerns of the watershed's stakeholders. It would also identify priority implementation actions (and set forth corresponding milestones) to attain and maintain the objectives, and would identify existing and potential sources of funding for implementation.

This approach will provide the necessary background information for the elaboration of a strategy for integrated management of protected areas (1.1.2.), detailed management plans in two critical

¹ Stock-taking and assessment complementary to the socioeconomic and environmental diagnosis carried out during the Block-A phase, including a more detailed analysis of critical parts of the watershed.

² Correlation analyses will allow an assessment of the following characteristics: (i) the *level of vulnerability* of the different landscape units; (ii) the *human development potential*, taken from social and economic data; (iii) *sustainability of the landscape unit*, estimated from the correlation of the human development potential with the level of vulnerability (level of environmental threat); (iv) *land-use potential* (according to the participatory diagnostic analysis carried out during the PDF Block A phase, potential uses consist of eco/agro-tourism, agriculture, agroforestry and sustainable use of native species); (v) *land-use efficiency*, correlation between *land-use potential* and current land use; and (vi) *environmental quality*, derived from the above indices.

micro-watersheds (1.1.3.), and the design and implementation of pilot activities in critical micro-watersheds (component 2).

Sub-activity 1.1.2. Formulation of a Strategy for Integrated Management of Protected Areas (PAs)¹ (coordinated by SEMA)

As an input to the formulation of the above-mentioned Management Plan for the Formoso Watershed, a strategy for integrated management of protected areas (PAs) of the watershed will be formulated and partially implemented in one or more pilot areas. This activity would aim at expanding watershed planning activities into an ecosystem context that would promote the idea of an integrated system of connected natural areas to protect biological diversity, while addressing livelihood and land degradation issues. It would also promote higher connectivity between fragments of the natural vegetation present in the watershed and the protected Atlantic Forest remnants found in the Serra da Bodoquena National Park. The design and promotion of the strategy would include:

- a) Identification and characterization of planned public and existing private PAs, including a diagnosis of the conservation status of existing PAs², their different management regimes and ongoing economic activities that affect their conservation status;
- b) Identification of areas that are potentially indicated for protection; and
- c) Identification and partial implementation, in one or more pilot areas, of corridors that would connect existing private and public protected areas (affecting approximately 9,500 ha of protected areas). This would include an evaluation of area connectivity, the identification of priority sites for intervention towards restoration of the original gene flow, and the design of a pilot implementing integrated management of PAs, creating a framework for its sustainable use. The corridors do not necessarily need to be virgin land, but would include appropriate land-use activities to safeguard their biodiversity values and functional integrity.

Sub-activity 1.1.3. Formulation of Detailed Watershed Management Plans for Two Critical Micro-watersheds (coordinated by Embrapa Soils)

This planning activity would be based on the application of a system approach to land-use planning in two critical micro-watersheds (approximately 9,000 ha located in the upper and middle sections of the Formoso watershed), taking into account the physical constraints, the opportunities for sustainable use of biodiversity (agroforestry and farming systems with increased agro-biodiversity), the underlying characteristics of the rural community, and the aggregated value of the protection of natural resources (biodiversity, soil and water). Complementary data to the GIS database will be collected (see details in Annex B) and mapped on a scale of 1:25,000. These land use-planning tools are critical for the design and implementation of alternative activities (component 2).

During the Block A phase, the Mimoso and Anhumas micro-watersheds were selected on a participatory basis as priority areas for intervention. Selection criteria included: degree of land degradation and associated biodiversity threats (deforestation, destruction of vegetation, etc.), concentration of springs and/or pristine aquatic habitats, vulnerability to erosion, potential for stakeholder participation, concentration of medium- and small-sized rural properties, importance/potential for ecotourism and other environmentally-friendly alternative activities.

Information generated by these activities are important inputs to the design and implementation of the Environmental Education and Community Participation activity (1.2.), the improvement of existing

¹ For the purpose of this project, the PAs would include proposed conservation units, private protected areas, and areas that are protected by Brazilian legislation in view of their environmental sensitivity (such as riparian forests or forests located on steep slopes).

² Identification with mapping and features of each PA would be provided by the GIS database

regulatory framework for biodiversity conservation and the enforcement of relevant legislation (1.1.4), and project monitoring activities (3.2).

Sub-activity 1.1.4. Harmonization of Existing Regulatory Framework for Integrated Watershed Management and Biodiversity Conservation (coordinated by SEMA)

In support of the implementation of watershed management planning, this activity will promote the review, and if appropriate, the development or revision of regulatory measures for improved watershed management and for integrated management of protected areas. It will include an evaluation of federal, state and municipal legislation regarding biodiversity conservation and the management and use of natural resources, the creation of PAs, other locally protected areas and corridors and the establishment of regulations for the restricted use of such conservation sites. GEF resources would finance the incremental costs of studies and workshops to formulate new and harmonize existing regulations and eventually incentive systems for sustainable and integrated management of natural resources at the provincial and local levels, compatible with national policies and laws.

Also under this activity, a process will be started to increase popular participation in the enforcement system executed by SEMA in selected priority biodiversity areas of the Formoso Watershed, complemented by the strengthening of SEMA at the local level. The project will establish a center (within the existing SEMA Office in Bonito) where the local population can register complaints or specific reports of infringements of regulations and ideas for the improvement of environmental management. SEMA will then compile and publish these community contributions and take action where required.

Activity 1.2. Environmental Education and Community Participation (coordinated by SEMA)

This activity will organize courses, workshops, and meetings with major "awareness providers" (community leaders, schoolteachers, and tourism guides) of the municipality of Bonito (Formoso watershed) with the participation of at least 180 local people. The main themes would be environmental legislation, and economic valuation of biodiversity and community participation techniques. This activity will increase awareness of biodiversity and conservation issues, ecotourism and sustainable development, raise the profile of project activities in the local communities, enhance sustainability and empower the local population to take a more active role in decision-making at the municipal level, as well as preparing stakeholders to deal with environmental conflict resolution.

Component 2: Development of Sustainable Activities in Pilot Areas (Total costs amount to US\$1,204,468 and associated incremental costs of US\$797,568, of which GEF US\$285,566 and GoB US\$512,002)

Incremental resources will support the transition to sustainable livelihood activities which will improve conservation of biodiversity as well as sustainable use of natural resources in the watershed and at the same time increase the welfare of participating communities.

This component will support the development of alternative activities for communities living in two pilot micro-watersheds (Mimoso and Anhumás) chosen for their particular importance in terms of biodiversity (see selection criteria under activity 1.1.3, Component 1), which will improve conservation as well as sustainable use of natural resources and at the same time increase the welfare of participating communities. These activities will be implemented on a demonstration basis, and lessons and experience from the pilot projects will then be disseminated to communities in other parts of the Formoso watershed and also to other parts of the larger Pantanal (within the Upper Paraguay River Basin) to foster replication of successful initiatives. (see project information dissemination activities planned under Activity 3.3.4). IDATERRA will be in charge of coordinating the implementation of this component in collaboration with the Municipality of Bonito, IAGRO

(Departamento de Inspeção e Defesa Agropecuária de MS), Embrapa, and the Federal University of Mato Grosso do Sul.

Activity 2.1. Development of Alternative Activities Based upon the Sustainable Use and Management of Natural Resources

This activity will promote the adoption, by the rural communities, of economic alternatives based on the conservation and sustainable use of biodiversity, drawing on the analysis carried out under 1.1.3. It will achieve this objective by implementing pilot projects to validate and transfer technology of sustainable farming systems, while conserving and enhancing environmental quality and biodiversity, and adding economic and ecological value to agricultural products. The expected outcome is reduced pressure on biodiversity, through an improvement in natural resource management in rural areas. The presentation of these economic alternative activities, associated with increased awareness provided under other project activities (Activities 1.2, 1.3 and 2.2), will foster ongoing protection efforts by the communities involved without continued external incentives.

The pilot projects will aim to boost the agrobiodiversity of the farms, through an increase in the number of animal and plant species used in the farming system, and through soil management techniques that enhance carbon sequestration, nutrient cycling, and soil biodiversity. They will also promote multifunctionality of the land, by guiding local farmers to integrate ecotourism activities into their sustainable farming systems and use additional income generated to balance any extra costs of switching from current to more sustainable farming practices. Pilot projects will also transfer sustainable technology to the rural community to process and market organic agricultural products.

Three sub-activities will be carried out under this activity:

Sub-activity 2.1.1. Implementation of the Support Center for Rural Activities and Agricultural Production (CEPA)¹ (coordinated by IDATERRA)

This will be a physical structure, based on the plant nursery managed by the Municipality, to provide support to field activities of the Project. The current structure is very weak and will be strengthened to support the activities of agro-forestry, recovery or enrichment of degraded riparian forests, processing of organic residues, incubators for free-range chicken, and food processing facilities. The Support Center will provide operational assistance to the pilot projects as well as ongoing assistance to local farmers in the fields of sustainable agricultural and other livelihood-enhancing activities, including indigenous technologies and crafts.

Sub-activity 2.1.2. Transformation and Use of Organic Solid Residues (coordinated by IDATERRA)

This sub-activity is essential to support the establishment of organic agriculture activities in the pilot units, and to disseminate organic technology to farmers in the region. According to concepts of agro-ecology and the objective of promoting agricultural activities associated with biodiversity conservation, this activity will be directed towards the rational use of the organic residues produced in Bonito, both in rural and urban areas. The residues already available in the region, if properly processed and applied, can reduce to a minimum the use of synthetic fertilizers, thus reducing production costs and water pollution.

¹ The center will be based on the plant nursery managed by the Municipality.

Sub-activity 2.1.3. Development of Pilot Units of Multifunctional Land Use (coordinated by IDATERRA)

The pilot units will be implemented on *model farms* located in critical micro-watersheds identified during the PDF-Block A. This sub-activity will be implemented jointly with landowners, ensuring their commitment and continuity after termination of the project. The pilot units will be designed to increase multifunctionality of rural areas, enhancing agro-biodiversity and income, and reducing land degradation processes. As mentioned above, these pilot units will be implemented on a demonstration basis, and lessons learned will be disseminated to communities in other parts of the Formoso watershed and also to other parts of the larger Pantanal (within the Upper Paraguay River Basin). The economic activities will be based on agro-forestry systems, integrating fruit plantations, sustainable management of pastures (including recovery of degraded pastures), soil conservation measures (minimum or no-tillage, crop rotation and consortia, hedgerows), use of organic residues/manure, free-range chicken, apiculture, on-farm small-scale processing of farm products, rural tourism or traditional crafts. All activities will follow the conceptual framework of agro-ecology, favoring conservation and recovery of natural resources and biodiversity. To qualify, *model farms* must demonstrate a base level of sustainable technology adoption, as well as a reasonable level of conservation and quality of the existing natural resources (so as to increase the possibilities of success in the short run, reduce investment requirements and risks of failure). The possibility of co-financing of the activities by landowners will be a further criterion for site selection, ensuring their commitment and enhancing the sustainability of the project (see Annex C for examples of potential economic activities).

Activity 2.2. Capacity Building and Training in Conservation and Sustainable Use of Biological Resources (coordinated by IDATERRA)

This activity will support the development and implementation of two capacity building programs aimed to train stakeholders of the Formoso watershed:

- (i) Program targeted at primary stakeholders (community leaders, representatives from farmers' organizations, staff from local NGOs, researchers and rural extensionists from the public and private sectors). This program will boost public awareness of conservation principles among the aforementioned stakeholders, and will contribute to increased communication among different institutions and local stakeholders, taking into account the diversity of past experience, strategic missions, organizational structures and professional profiles. It will focus on four areas: a) agro-biodiversity and sustainable land use; b) environmental planning and management for the conservation of biodiversity; c) ecotourism and sustainable development; and d) environmental conflict resolution. The training program will be coordinated by specialists in these respective fields. The first task will be an assessment of the different levels of knowledge and demand for additional training by different project participants. This will be followed by the design of specific training activities for different target groups. Video technology, interactive programs and conventional training methods will be applied. Training will be delivered to at least 50 individuals who can act as disseminators of the concepts and methodologies of the project in their respective institutions or local communities;
- (ii) Program aimed to train about 150 farmers and rural workers in alternative sustainable livelihood practices based on agriculture and traditional knowledge, disseminating the lessons from land-use analysis and planning (component 1) and pilot projects (activity 2.1) and fostering successful replication and sustainability. This program will include demonstration visits to model farms and other relevant sites or institutions.

Component 3. Project Management, Monitoring and Evaluation and Information Dissemination
(Total costs amount to US\$806,147 and associated incremental costs of US\$642,806 of which GEF US\$376,126 and GoB US\$266,680)

This component consists of activities necessary for project management, which involves planning, monitoring and evaluation of the project's inputs, outputs and impacts. Embrapa Soils will be responsible for this component, as the main executing and coordinating agency.

Activity 3.1 – Project Management and Organization (coordinated by Embrapa Soils)

This would comprise all activities required for project implementation, including project management, procurement, disbursement, financial audits, internal evaluation and provision of technical and support services. In addition, to ensure full stakeholder participation in project decision-making, a Project Deliberative Committee (PDC) will be created with representatives of major stakeholders. Financial and Technical Units will be created to aid project management. The Technical Unit will be under the leadership of a Project Technical Coordinator, who will facilitate day-to-day coordination among the different implementing agencies (see Annex D).

Activity 3.2. Project Inputs and Outputs Monitoring System (coordinated by Embrapa Soils)

This activity will be implemented over four years and support project management by monitoring its progress and performance according to input and output indicators. These will be based on parameters defined by the Monitoring and Evaluation Plan that will be formulated during the first six months of the Project. It will be generally based on the Project Logical Framework (Annex A). A refinement of the performance indicators and their descriptors must necessarily include participation of representatives of civil society, particularly those directly impacted by the project, and of the local government. A workshop will be carried out in Bonito, with the participation of project technical staff and stakeholders, aimed at defining the detailed M&E Plan. The output of the workshop will enable formulation of the final version of the Plan by the Project Technical Coordinator/PM, which will be submitted to the Project Deliberative Committee (PDC) for deliberation.

Implementation of the M&E Plan will be the responsibility of the Project Manager (PM), aided by the Technical Unit. The Project Technical Coordinator will produce progress reports every six months which will be submitted to the Project Manager (PM). Eventual proposals for reviewing project design and implementation will be submitted to the PM whenever necessary.

Project evaluation will be carried out yearly by M&E experts, selected by the PM based on their demonstrated knowledge of GEF and World Bank requirements, previous experience in evaluating participatory projects with emphasis on conservation issues, and with practice in understanding the economic, social and cultural context of Brazilian rural communities as well as their environment.

The data required for monitoring and evaluation will be available through the project's progress, annual and final reports, structured interviews and questionnaires, remote sensing data, field survey reports, and event programs and attendance lists (see annex A).

Activity 3.3. Project Impact Monitoring System (coordinated by Embrapa Pantanal)

Project impacts on biodiversity, soil, water and society will be monitored in order to assess the effectiveness of project interventions in assuring conservation of biodiversity of global importance, in concomitance with the development of economic activities that are ecologically, economically and socially sustainable.

This monitoring system will be based on scientifically sound methodologies of field assessments coupled with an analytical laboratory approach.

Field survey reports will be based on the collection and analysis of data defined as the best descriptors of proposed impact indicators. This will allow evaluation of the extent to which the project achieved proposed objectives in the short term (3 years). The sub-activities described below are aimed at the collection and interpretation of several indicator descriptors, grouped by data needs and subjects, and will focus on the measurement of trends rather than absolute values. The Project Impact Monitoring System and Information Dissemination will be designed and implemented in accordance with the Monitoring and Evaluation Plan, to be consolidated during the first six months of the Project.

Parameters in each category are chosen in accordance with their relevance to biodiversity conservation and livelihood enhancement. Regarding social and economic indicators, some will be monitored in the intervention sites and others, such as environmental education and farmer training, which have diffuse effects, across the whole watershed, and made available to the public through two major instruments: (i) a website to be developed by the project, to ensure that project impact information and lessons learned are disseminated within Brazil and internationally; and (ii) periodic bulletins containing relevant information to be shared and commented by stakeholders at the local and State level.

The baseline information against which monitoring will take place will be constituted by the information generated under Activity 1.1. Information generated by monitoring activities should then also feed back into the watershed management process.

Sub-activity 3.3.1. Monitoring of Soil and Water Quality Indicators (coordinated by Embrapa Western)

Soil indicators (Embrapa Western).

Biological, chemical and physical parameters will be monitored in the soils of the *model farms* of the project to identify trends over time in soil and aquatic biodiversity and determine whether project intervention and management will be producing the desired results or will need to be changed. The parameters were chosen as a function of their relevance to biodiversity conservation (flora, fauna, soil arthropods and microorganisms), since life is significantly reduced in degraded soils. The selected parameters directly reflect the state of soil degradation, as well as its water retention capacity, reducing the destructive power of surface, channel, and gully erosion during tropical storms. They also take into account carbon sequestration, contributing to the reduction of the greenhouse effect.

The parameters chosen are the following:

Biological parameters:

- Microbial activity
- Soil microbial and fauna diversity

Chemical parameters:

- Total organic carbon

Physical parameters

- Aggregate stability
- Water retention capacity
- Infiltration rates

Aquatic Biodiversity (SEMA).

To assess the response of aquatic biota to improved water quality as a result of project interventions, limnological studies will be carried out in the streams of the two critical micro-watersheds. Major indicators would be fish and benthic fauna (particularly benthic macro-

invertebrates). The water quality parameters to be monitored are those directly affected by the proposed project activities, namely the transport of sediments eroded from agricultural and grazing lands. An automated sediment monitoring station will be installed in a control section (strategically located in the main catchment drain) of each of the pilot units, with an extra one placed near the catchment sink. This strategy will enable quantification of the contribution of the project activities (site-specific in *model farms*) to the reduction in sedimentation of the catchment as a whole. Local farmers, staff from the municipality and state environmental monitoring agencies will be trained in the use and application of the monitoring stations, as well as in the conceptual framework of this approach for erosion monitoring. This approach has been successfully applied in the state of Santa Catarina, and is currently being applied to monitor the erosion process in the Taquari River sub-basin (a project coordinated by Embrapa Soils). The monitoring stations have sensors to measure sediment concentration, water flux, and rainfall. Data are collected in real time, continuously, in a data logger, and transferred via satellite to the monitoring computer strategically located in the office of the environmental monitoring agencies.

Sub-activity 3.3.2. Monitoring of Terrestrial Biodiversity Indicators (coordinated by Embrapa Pantanal)

Monitoring of Bird Diversity (Embrapa Pantanal)

The interventions planned for the *model farms* are focused on the increase in plant species cultivated as crops or trees, or used to enrich degraded protection areas such as riparian forests, as well as on the reduction of the environmental impact of agricultural activities, such as the use of pesticides. Change in abundance and richness of bird species has been selected as the major fauna indicator to be monitored by the project, since they are strongly associated with the vegetation, and are expected to respond faster to changes in the plant species composition of a landscape. The project has a duration of 4 years, and other important components of fauna, such as mammals, would have a slower response to the project's interventions. Changes in the diversity of mammals are expected to take place after a minimum of 5 years of the site interventions; therefore they were not considered an effective indicator for this project.

Bird monitoring will be carried out by the use of mist nets, transects and visual field observations. Depending on the species habit, the observations will be made by day or by night.

This activity will be implemented in collaboration with Embrapa Beef Cattle.

Monitoring of the Vegetation Cover (Embrapa Beef Cattle)

This activity will have two levels of monitoring, a) site-specific (in the pilot micro-watersheds), and b) comprehensive (entire watershed). The site-specific monitoring will provide the indicators of success of land use changes with respect to their effects on the biodiversity of both human and natural environments. The comprehensive monitoring will provide indicators of how the project has affected the rates of deforestation and the conversion of land use of the watershed, which will be a measure of the local population's change in awareness during the duration of the project.

The vegetation map will be produced by activity 1.1 (*Development of Watershed Management land and Promotion of Integrated Management of Protected Areas*) at a scale 1:100.000 in the entire watershed, and at a scale 1:25.000 in the critical micro-watersheds, where the pilot projects will be located. A more detailed map of vegetation in the pilot units will be produced by field assessment of key species indicators of a vegetation class.

A phyto-sociological assessment will be carried out in the *model farms* and constitute the baseline information for monitoring. The method of centered quadrants will be used for this assessment on the natural environments (riparian vegetation, primary and secondary forests). Four size classes of trees will be monitored during the three years of the project. Other indicators to be used are the seed and

litter fall in the monitored areas, which will indicate how changes in the local environment affect the diversity of plant species and the biomass content of the soil. The method of squares will be applied to monitor vegetation at the landscape level, where the abundance, frequency, richness and diversity of tree species will be scored, as well as the structure, biomass and visual estimate of the percentage of cover in the sampling unit.

The change in the number of animal and plant species used productively on the *model farms* will also be monitored. In the last year of the project, this indicator will be evaluated in the critical micro-watersheds as a whole.

This activity will have the collaboration of Embrapa Soils, Embrapa Pantanal, SEMA-MS, IDATERRA, and the UFMS (Federal University of Mato Grosso do Sul).

Sub-activity 3.3.3. Monitoring of social and economic indicators (coordinated by Embrapa Soils)

The success of this project will be measured mainly by the potential adoption, by the rural community, of the development model implemented, which is based on the conservation and sustainable use of biodiversity. This will happen provided the set of economic activities executed in the *model farms* results in an increase in the net income of the farm. This may not happen in three years, particularly in agro-forestry interventions, but simulations of profit margins could be made. Land-quality indicators will also be applied in order to evaluate the sustainability of the alternative activities implemented by the project in the critical micro-watersheds.

It is expected that the pilot units, together with participatory land-use planning, environmental education, and workshops and events to be executed by this project, will result in higher community involvement and an enhanced awareness of local stakeholders with regard to the need to conserve biodiversity as a means to increase their own economic sustainability, and even to profit from it. This change of attitude will be monitored by measuring local participants' perception of biodiversity as an integral part of rural production systems and therefore of the need to protect and use it on a sustained basis, and the extent to which community feels involved in management at different levels.

This sub-activity will also include an assessment of institutional and regulatory factors, and the relationship of institutions and laws with biodiversity conditions.

The methodology will consist of the application of a questionnaire survey, through interviews carried out in a sample of rural households' representative of the different economic sectors present in Bonito in the final year of the project.

Activity 3.4. Project Outreach and Information Dissemination (coordinated by Embrapa Soils)

Dissemination and diffusion of project initiatives, results and impacts will be implemented under this activity, by using all the available means of communication including websites, newsletters, bulletins and workshops, to stimulate participation of stakeholders in the Formoso watershed and to ensure that the lessons learned are shared and commented on by actual and potential beneficiaries at the local, state and national levels, as well as at international fora (through the internet and publications).

At the local level, the target audience for information dissemination will include about 150 farmers (principally through farmer to farmer contacts) and other key stakeholders in the Formoso Watershed (local tourism agents, guides, entrepreneurs, artisans, Bonito citizens, state and municipal environmental and agricultural officers working in the Formoso watershed). At the state and national levels, information will be disseminated to natural resources managers and scientists through conferences, publications and a project homepage. All project material to be disseminated will emphasize the importance of participatory planning and management for the conservation and sustainable use of biodiversity, and the lessons learned from the adoption of a watershed as an ecosystem boundary for planning and management.

E. SUSTAINABILITY ANALYSIS AND RISK ASSESSMENT

a) *Sustainability factors*

The sustainability of project activities and outcomes is dependent on the success of the project in achieving proper behavioral changes in the local community to ensure the sustainability of their agricultural and eco-tourism vocation. This will be the driving force for the continuous education and enforcement of rational natural resource use and management, which will protect biodiversity. Local community interest and engagement became very clear during the project-planning workshop, when the project rationale was presented.

- Complete commitment of local, state and private institutions to proposed project goals, such as product diversification, alternative and sustainable farmer revenue sources, etc. This includes state government commitment to invest in sustainable development.
- The economic strength of tourism in the region, which depends directly on biodiversity conservation.
- The need for an increment to the 6-year-long IDB-Pantanal project, which will provide environmental services and focus on watersheds which already face severe degradation at the headwaters of Pantanal.

Besides community engagement, a number of other factors will provide a solid foundation for long-term sustainability of project activities and outcomes:

i) **Technical** - The Formoso Watershed Management Plan will enable local stakeholders to carry out the planning and implementation of sustainable activities in other micro-watersheds as well as other watersheds of global importance to biodiversity conservation, particularly through use of the GIS database that will be developed. The water monitoring stations to be installed in the watershed will continue to provide a measure of the sustainability of land use, even after project completion. Local stakeholders will also be trained in the monitoring of diversity of plant and bird species, particularly in riparian vegetation.

ii) **Social** - The environmental education program will assure that stakeholders are aware of the need for sustainable use of biodiversity and sound land management approaches. This will, in the long term, result in better quality of life and higher social standards, particularly for rural communities.

iii) **Economic** - The pilot units are aimed at demonstrating that by increasing agrobiodiversity, diversifying farming functions, and aggregating value to agricultural products, profits will be sustainable. The information and dissemination activity of the proposed project will facilitate adoption by a greater number of farmers. The higher environmental quality of sustainable farms will reflect on added value for tourism attractions, with potential economic gains for the urban sectors linked to tourism (shops, hotels, restaurants, etc.).

iii) **Institutional** - Enhancement of the partnership between rural community associations and agricultural and environmental research and extension services, which is favorable for disseminating technical knowledge and technology, so as to increase adoption of sustainable production systems.

b) *Risk Assessment*

One of the pillars of the sustainability of the proposed project is the successful implementation (in model farms) and dissemination of alternative livelihood options that promote conservation and sustainable use of biodiversity. The main baseline to this activity is the IDB Pantanal Project, which will provide technical assistance and financial support to farmers and improve environmental services

in the Upper Paraguay River Basin. Two major risks to the sustainability of the proposed project would be: i) a possible lack of concatenation (temporal and spatial) between the baseline activities associated with the IDB project and the incremental activities of the proposed project and ii) eventual reluctance of the farming community to invest in agricultural conservation techniques, given the perception of delayed direct benefits, the possible high cost of the recommended practices, and the need for collective action at the micro-watershed level. However, the latter will be addressed by the project through the promotion of participatory approaches to upgrade land management practices among farmers and rural communities. This may accelerate the introduction of improvements that reduce cash costs and labor requirements, give early increases in farm productivity, and improve the chances for farmers to stay in business and on their land even in an increasingly unfavorable trading environment. In addition, the project will support farmers' training program, including demonstration visits to farmers to promote technology associated with more profitable and sustainable farming systems.

The Project Management team will take safeguards against those risks by keeping strong communication and managerial links with coordinators of the IDB project. Initial links have been established during the PDF-Block A, and an effective communication between both projects will be established during the outset of the proposed project.

Another project risk is associated with eventual cash-flow problems that farmers involved in the pilot units may undergo during project implementation. One of the bases for sustainability of the project is the effective participation of farmers in the implementation of the pilot units in model farms, which includes their charge for part of the costs involved. Therefore, eventual economic crises causing reduction in the financial strength of farmers involved in the project may lead to project risks. In order to face this potential problem, selection of model farms will take for granted the properties' baseline situation: infrastructure, human resources, need for extra investment in order to carry out project activities, managerial skills of farmers, quality of natural resources, and most importantly, the farmer's commitment. Likewise, the eventual weakening of the project's executing agencies comprises an important risk, given that those activities may be hampered by cuts that could affect the project's counterpart, such as personnel, shortage of equipment and running costs, such as maintenance of vehicles, for example. The commitment of federal, state, and municipal governments to the objectives of the project, as well as recent promising results regarding control of Brazil's public deficit, constitute an important assurance that institutions involved in this project (Embrapa, IDATERRA, Bonito Municipality, and SEMA) will comply with the proposed counterpart costs.

Accidental, natural or criminal bush fires also represent major risks to the project, as activities such as agro-forestry, fruit plantation, riparian vegetation recomposition, producing slow results, could be lost very quickly by fire. The Government of Mato Grosso do Sul and the Ministry of Environment are initiating a Fire Prevention and Control Program that will last throughout the project's lifetime and will contribute to reduce this highly significant risk.

Another relevant risk is the limited local institutional capacity and discontinuity of political support from local and State governments. The main element to counterbalance this risk is the involvement of a federal institution (Embrapa) as both executing agency and project coordinator. Besides complementing state and local institutions' competence and infrastructure, Embrapa Soils, as a research unit located outside the state's boundaries, has no political involvement nor is subjected to unlikely hindering policies that could be adopted by local or state governments during the lifetime of the project. Furthermore, this proposal involves the hiring of a local Technical Project Coordinator and the increase of infrastructure capacity in Bonito, which will strengthen local capacity. Another factor to guarantee political support to the project will be the involvement of local stakeholders in all stages, especially in the Project Deliberative Committee, the major decision-making body of Project Management (Component 3).

F. STAKEHOLDER INVOLVEMENT AND SOCIAL ASSESSMENT

a) Stakeholder Involvement

The project planning process was carried out with the active participation of land users and other local stakeholders, thus ensuring their involvement in the various stages of project formulation. This methodology resulted in the build-up of a formal network linking federal, state and municipal governmental agencies, as well as an informal one connecting local leaderships with a potential for assuming a key role in project implementation.

Project preparation started in September 1999, with a series of meetings in Bonito, Campo Grande and Rio de Janeiro, involving FAO and the World Bank with EMBRAPA Soils, IDATERRA, SEPROD, SEMA, the Municipality of Bonito and key stakeholders identified in the Formoso Watershed area. These meetings had the principal objective of presenting and discussing GEF and World Bank guidelines and policies for project preparation, as well as understanding the profile of the different institutions present at the local level and evaluating their interest in partnership-building for the project preparation and implementation phases.

A core-working group comprised of staff from the Municipality of Bonito, EMBRAPA, IDATERRA and SEMA, responsible for project preparation, was formed as a result of these meetings. The preparation process included the following activities with support from the Block A GEF grant:

- a) Elaboration of a Socioeconomic and Environmental Diagnostic Analysis for the Formoso Watershed, which provided a comprehensive understanding of the Formoso Watershed's dynamics and involved baseline studies and surveys in the field (rapid appraisal) to compile social, economic, institutional, legal and environmental/biodiversity situation analysis of the watershed;
- b) A one-week training course held in Bonito with the participation of staff from EMBRAPA, IDATERRA, SEMA and the Municipality of Bonito, to provide them with basic technical and operational elements for project preparation in line with GEF and WB policies, including methodology for carrying out the aforementioned baseline studies and field surveys;
- c) Project preparation workshop, held in Bonito and attended by around 40 people from different institutions and local communities representing a broad spectrum of stakeholders. The most significant outcome of the workshop was an initial proposal for the project's structure and management system;
- d) A series of technical and managerial meetings in Campo Grande involving EMBRAPA, EMPAER, SEPROD, SEMA and the Municipality of Bonito in order to jointly design the final project proposal;

One of the specific tasks assigned to the above-mentioned core working group was the collection and systemization of available data of the Formoso Watershed and surrounding areas, as a basis for the preparation of the Socioeconomic and Environmental Diagnostic Analysis.

It should be pointed out that the stage of diagnostic analysis provided an excellent opportunity to increase integration at local level among institutions adopting different working methodologies, and with distinct interests and profiles/"cultures," but seeking a common goal. In addition, during the diagnostic and training phases, the institutions involved had the opportunity to exchange their views on the project and on the design of a strategy for conflict resolution and consensus building, and for consultation with local communities, which led to a broader knowledge of project objectives and a more realistic approach for the diagnostic. During the training and fieldwork lasting about 10 days, interviews and meetings were conducted with local farmers and associations.

The diagnostic also helped to identify, on a preliminary basis, the governmental and non-governmental institutional framework at the local level, multiple stakeholder participatory instances (CONDEMA, CMTUR, CMDR, CIDEMA). It is important to note that, in this particular watershed, besides the agricultural segment, the tourism sector represents a key element for project sustainability.

However, the major event during the PDF Block A phase was the project preparation workshop, which was aimed at: a) presenting and discussing the results of the aforementioned diagnostic analyses; b) discussing the institutional framework and a proposal for the project management system; and c) defining the main lines of action to be supported by the proposed project.

The following institutions attended the workshop: EMBRAPA, SEPROD, IDATERRA, SEMA, Municipality of Bonito, IPEA, COPERPLAN, ESALQ/USP, Universities (*Universidade Católica Dom Bosco* and *Universidade Estadual de Mato Grosso do Sul*), ATRATUR (Bonito Tourist Attractions Association), Tourism Guide Association, ECOA, Fundação Neotrópica, Fundação Biótica and many representatives of local farmers and small landowners. Finally, it should be mentioned that the workshop was characterized by a very high level of participation.

The final stage of project preparation involved a significant exchange and negotiations among potential executing agencies and two meetings held in Campo Grande for the final adjustments. Although these negotiations led to some delay in the time frame, they allowed a better understanding of project principles and responsibilities and a lower risk for the implementation phase.

It is clear that the participatory process and stakeholder involvement were initiated during and even prior to the PDF Block A phase. This consultative process will be continued throughout project implementation to enhance ownership and guarantee institutional sustainability.

b) Social Assessment

Analysis of population trends, dominant economic activities and overall size distribution of rural establishments of the Formoso Watershed have allowed the distribution of local project beneficiaries into 4 main categories:

- a) Small-sized land owners carrying out subsistence farming, in some cases including cattle husbandry and/or tourism (148 properties, 54.6% of the total);
- b) Medium-sized land owners carrying out integration of cattle husbandry and agriculture (38 properties, 14% of the total);
- c) Medium-sized land owners integrating agriculture and/or cattle husbandry with tourism (16 properties, 6% of the total);
- d) Local groups and agencies related to the tourism planning and development (39 properties, 14% of the total).

In general, local trends in population dynamics reflect overall regional tendencies. Between 1980 and 1991 a 20% drop in the rural population of Bonito was observed. This highlights the importance of project activities directed at enhancing the economic sustainability of rural areas and the need for innovation and improved technologies of low environmental impact.

The Bonito Municipality contains 226 small rural properties (less than 100 ha), which correspond to 30.7% of the total. The majority of these are situated in the Formoso Watershed (65%, or 148 properties) which highlights the social significance of this project. The main economic activities found in the Formoso Watershed's rural properties can be summarized as follows:

Economic Activity	Number of properties (percentage)	% related to the total
Cattle husbandry	154	57
Agriculture	7	3
Tourism and leisure	40	14
Mineral activities	1	-
Cattle husbandry and agriculture	35	13
Cattle husbandry and tourism	11	4
Cattle husbandry and mineral extraction	3	1
Cattle husbandry, tourism and mineral extraction	2	1
Agriculture and tourism	1	1
Agriculture, cattle husbandry and tourism	3	1
Agriculture, tourism and mineral extraction	2	1
No precise information	12	4
TOTAL	271	100

Cattle-raising activities are usually associated with low technological standards and agricultural standards vary considerably from area to area. In general, chemical fertilization procedures are not employed and very few measures are taken concerning soil conservation. The systems adopted are generally not sustainable and depend entirely on natural soil fertility, causing serious erosion problems and degradation of water resources by siltation. The interesting point is that practically all the properties are managed by their own landowners.

II. INCREMENTAL COST ASSESSMENT

Project Goal

The project goal is to contribute to the conservation and sustainable use of biodiversity of global importance, including agro-biodiversity, and to promote the control of land degradation in the Formoso Watershed. This would be achieved by directly addressing the identified threats to the watershed's biodiversity. The project's interventions would be concentrated in the upper/middle sections of the Formoso Watershed and would foster increased public support through targeted dissemination activities, public involvement and education. Activities planned would complement rather than replace ongoing government and project initiatives and target the generation of global environmental benefits which are not realized under the baseline scenario.

Baseline Scenario

In the absence of additional GEF funding, there would be a number of ongoing activities which contribute to the project goal. The estimated costs of baseline activities amount to *US\$730,597*.

Participatory Planning and Management for the Conservation and Sustainable Use of Biodiversity. (*US\$160,356*)

The "Project Flora" implemented by EMBRAPA (*US\$15,784*) will survey flora species in MS and FUNDECT will survey birds and mammals in the Upper Paraguay River basin (*US\$27,322*). Both projects will enhance the knowledge base on the headwaters of the Formoso River (Bodoquena Mountain), contributing to the baseline for monitoring biodiversity changes in the area. In the field of environmental education, the GEF/OAS-financed "Integrated Watershed Management Program for the Pantanal and Upper Paraguay River Basin (*US\$50,000 – not included in the baseline total*) will train schoolteachers from Bonito and the Bodoquena Mountain to disseminate understanding of environmental issues and protection methods. SEMA will continue the application of its environmental licensing system for facilities in Bonito (*US\$15,000*), which will be improved as a priority within the ongoing work program, and the enforcement of environmental and forest regulations (*US\$15,000*). SEMA will also strengthen PPAs (*US\$15,000*) and support the protection and recovery of environmentally sensitive areas protected by the Environmental and Forest Laws (*US\$15,000*). Finally, under the IDB-financed Program for the Sustainable Development of the Pantanal, the SEMA office and the State Forestry Police will be strengthened through the provision of field equipment, vehicles and training (*US\$57,250*). This program will provide state-level institutional strengthening related to: a) improved water resource management and increased water user participation and b) both green and brown environmental issues.

These baseline activities will contribute to improving the knowledge and understanding of biodiversity in the project area, but they will focus on water resource and environmental management and not cover all priority sites within the Formoso Watershed, in terms of species richness and threats to biodiversity. The teacher-training program will increase awareness of environmental issues, primarily among schoolchildren, but will not target farmers with the aim of including biodiversity considerations into their land use practices. There will be no systematic efforts to ensure community participation in the land planning process. Ongoing activities will not increase the existing knowledge base of the physical, biological and socioeconomic nature of the Formoso Watershed, needed for the formulation of an effective management plan for the conservation and sustainable use of biodiversity and its implementation in the watershed. SEMA's activities to strengthen private and public protected areas will contribute to the protection of biodiversity, but the existing state environmental management system, with its limited budget and consequent limited geographic scope and depth, in itself will not halt the process of further depletion of biodiversity in the Formoso Watershed. SEMA's ongoing activities will not include the development of a strategic action plan for the integrated management of protected areas in the Formoso Watershed that would characterize the conservation status of existing PAs and identify potential candidate sites for protection status as well as ecological corridors.

Development of sustainable activities in pilot areas (US\$406,900)

The IDATERRA adaptive research and extension program will support farmers in traditional agriculture but also increasingly in conservation techniques (US\$22,000). The IDB program will strengthen the existing research and extension services in the Formosa Watershed, providing financial support to individual farmers for conservation farming activities (US\$177,000), collective goods and services, such as field machinery (US\$157,000), rural mobilization for micro-watershed management (US\$20,000) and equipment for the IDATERRA office in Bonito (US\$11,500). The same project will also address the problem of waste and contamination by improving water supply, sanitation and solid waste processing facilities in the urban areas of the Pantanal, including the municipality of Bonito (US\$19,400).

Baseline activities will make a valuable contribution to the development of environmentally sustainable livelihood strategies, but they will focus on sustainable production systems with reduced erosion and increased yields. The interventions will not cover all of the critical parts (especially the upper and middle sections) of the Formoso watershed, which retain biodiversity of global importance and upon which the proposed project would focus. IDB interventions in the Formoso Watershed would tend to focus on the more degraded and threatened parts of the Formoso Watershed and would not specifically address the requirements for diversification in the upper and particularly in the middle parts of the Formoso, where the ecosystems are still largely intact, but which are under threat of degradation unless urgent action is taken to safeguard the pristine conditions. Finally, although the IDB-supported program will promote economic alternatives to unsustainable agriculture practices (such as ecotourism and traditional handicrafts) and provide technical assistance to farmers, it will not address the specific problem of contamination from excessive application of synthetic fertilizers nor explore potential organic farming solutions, such as the adoption of organic/animal and green manure practices.

Participatory Project Management, Monitoring and Evaluation and Information Dissemination (US\$163,341)

SEMA's current environmental monitoring program is limited to water quality monitoring in the Formoso river and three of its tributaries measuring, among others, 18 physical-chemical and bacteriological parameters (US\$143,472). The aforementioned EMBRAPA/FUNDECT survey of birds and mammals of the Upper Paraguay River basin including the Bodoquena Mountain (headwaters of the Formoso) will contribute to improving available information on the status of biodiversity in the watershed by identifying the conditions of some of the target biodiversity at the early stages of project implementation as a necessary benchmark, against which management-induced changes can be identified and measured. However, these surveys will not generate sufficient background information to allow assessments of changes in biodiversity as a result of specific interventions under the baseline scenario.

The Embrapa Soils Communication for Technological Transfer project (US\$ 19,869) will improve awareness of soil science, but without explicit integration of biodiversity protection issues, such as: environmental conflict resolution, biodiversity value and alternative and sustainable uses such as tourism.

Benefits – Baseline. Baseline activities will mainly achieve benefits at the local/regional level, including a) improved wastewater treatment and solid waste disposal in the urban area of the Formoso watershed (the town of Bonito) and concomitant improvement in water quality, b) improved knowledge of the flora and fauna in parts of the project area; c) increased number of private protected areas (by facilitating the application of a state law of incentives to land owners that establish PAs on their properties), d) increased beneficiary incomes at the individual farm level; and e) better understanding among the rural community of environmental issues.

Nevertheless, despite existing activities and efforts supported under the baseline program, there remains much to be done to ensure adequate protection and sustainable use of biodiversity, and to prevent land degradation in the Formoso Watershed with the participation and close collaboration of local communities. In the absence of this proposed MSP, the conservation of natural habitats with relatively stable or intact conservation status will remain largely dependent on the existing state environmental management system which suffers from severe budget constraints and an ineffective legal framework, lack of a strategic plan or an effective management strategy for the conservation and sustainable use of biodiversity. In addition, while a number of educational activities planned under the baseline will contribute to increased awareness of environmental issues, there is a lack of training to enhance technical expertise at the state and local level, and to increase community participation in environmental and watershed planning. Moreover, interventions so far have focused mainly on licensing and enforcement systems which do not take community participation into consideration and integrated actions at local, state and federal level will not be optimized in the absence of the proposed project. Implementation of baseline scenario could therefore result in fragmentation of important habitats with concomitant biodiversity loss, natural resource degradation in agriculturally marginal but globally important ecosystems of the Formoso watershed.

The baseline also goes some way towards generating global benefits by protecting biodiversity of global importance. However, the area and number of species of global importance are vast and the country's financial resources for conservation activities are severely limited, which points to the need to complement commendable government initiatives by more far-reaching interventions funded by global transfers.

GEF Alternative

The GEF alternative would build upon the baseline scenario and complement the activities with the aim of protecting the unique features of the Formoso Watershed, especially in the pristine upper and middle sections of the watershed, before human pressure can lead to increased degradation as already present in other parts of the Pantanal. Costs of the GEF alternative are US\$2,907,288.

Participatory Planning and Management for the Conservation and Sustainable Use of Biodiversity.
(Total costs: US\$871,673, incremental costs: US\$711,317, of which GEF US\$313,218 and GoB US\$398,099)

Under the *GEF alternative*, the development of a biodiversity management plan for the entire Formoso Watershed, complemented by the development and initial implementation of two detailed plans for critical micro-watersheds in the upper/middle sections of the Formoso Watershed, will greatly enhance the knowledge base of biodiversity-related issues and constraints. This planning process will allow for the identification of: a) options for resolving these issues and constraints (policy, institutional, regulatory and technology options) and b) priority interventions drawing on the options identified to protect biodiversity of global importance. Project activities to design and promote a strategic action plan for the management of protected areas in the Formoso Watershed will build on SEMA's existing efforts and complement them by providing a strategic management framework for ongoing and future conservation priorities. Training project participants to integrate biodiversity management concepts into their regular work will form the basis for a full integration of biodiversity conservation issues into regular government programs in the area. The environmental education and training activities targeted at communities will concentrate on biodiversity aspects of farming and other livelihood activities and provide an opportunity to extend the implementation of SEMA's new policy on community involvement into rural areas and enhance support and sustainability at local level. It will also form the basis for ongoing community involvement in decision-making at the municipal level. As part of the project activities to improve the regulatory framework for biodiversity conservation and enforcement, communities will also be given the opportunity to take a more active role in enforcement of environmental regulations through the creation of a citizens' center in the SEMA office in Bonito which collects complaints and reports of infringements.

Development of Sustainable Activities in Pilot Areas (Total costs: US\$1,204,468, incremental costs: US\$797,568, of which GEF US\$285,566 and GoB US\$512,002)

The *GEF alternative* will support the development of sustainable activities for communities living in two pilot micro-watersheds based on the analysis provided by detailed management plans. Incremental resources will support the transition to sustainable livelihood activities which will improve conservation of biodiversity as well as sustainable use of natural resources in the watershed and at the same time increase the welfare of participating communities. The activities identified would provide the basis for establishing sustainable livelihood options, protecting and using biodiversity to generate benefits to local communities. Diversification will reduce pressure on the resource base which sustains biodiversity, support for farm-level ecotourism would allow farmers to profit from increased protection and at the same time reduce traditional tourism development which has been contributing to degradation and biodiversity depletion. Increased awareness and the presentation of alternative activities should also foster ongoing protection efforts by the communities involved without continued external incentives. Training activities, including demonstration visits, to communicate lessons and experiences from pilot activities to communities in other parts of the Formoso Watershed would widen the impact of project activities on the conservation of biodiversity of global importance.

Participatory Project Management, Monitoring and Evaluation and Information Dissemination (Total costs: US\$806,147, incremental costs: US\$642,806, of which GEF US\$376,126 and GoB US\$266,680)

The *GEF alternative* will enable effective participatory project management, through the creation of a Project Deliberative Committee, with the participation of major stakeholders. A local bureau (Technical Unit), run by the project's Technical Co-ordinator, will be set up in the city of Bonito to organize, systematize, coordinate and make project activities operational.

The managerial and technical capacity of relevant agencies to implement the project will be strengthened.

Developmental and impact indicators will be selected, and a Monitoring and Evaluation Plan will be formulated in order to continuously assess inputs, outputs and impact of project interventions.

Monitoring will focus on measuring trends rather than absolute values, and would include:

- assessment of changes in biodiversity (flora and terrestrial fauna-related factors);
- assessment of changes in soil and aquatic biodiversity; and
- evaluation of socioeconomic, institutional and regulatory factors, to monitor the impact of human activities on biodiversity, and the relationship of institutions and laws to biodiversity.

The baseline for project impact monitoring activities will be provided by information generated: a) through baseline water and fauna monitoring activities, which will provide a picture of the condition of target biodiversity at the early stages of project implementation; and b) in the context of the development of the management plans for the Formoso Watershed and the two micro-watersheds. These activities would not only be of vital importance for the assessment of project impact and the validity of the pilot approach as well as its suitability for replication at the larger scale, but would also contribute to an improved general understanding of the relationship between economic activities and biodiversity in the project area, and provide a useful input to the improvement of ongoing government and other project activities.

GEF funding will allow dissemination and diffusion of project activities, results and impacts, in order to stimulate participation of stakeholders in the Formoso watershed, and to ensure that lessons learned are shared and commented on by actual and potential beneficiaries, maximizing thus the sustainability of GEF-supported activities beyond the GEF funding period.

Benefits – GEF alternative. The GEF alternative achieves significantly greater protection of endangered biodiversity of global importance in the Formoso Watershed. Increased community participation in environmental planning and enforcement fostered by the project strategy in turn increases sustainability of interventions. The benefits of supporting the transition to livelihood options built on biodiversity-friendly activities and on enhancing the protection of a pristine ecosystem of global importance within and outside the protected area system, occur predominantly at the global level and therefore warrant GEF funding.

Incremental Cost Assessment

The incremental costs associated with the GEF alternative are *US\$2,176,691*, of which *US\$1,176,781* are committed as counterpart funding by the GoB. GEF funds would be requested to cover *US\$999,910*.

Incremental Cost Table

IC Table (GEF-Bonito, Brazil)	Baseline			Increment			TOTAL (baseline + increment)
	GOB	IDB	Total	GEF alternative	GOB counterpart	Total	
1. Participatory planning and management for the conservation and sustainable use of biodiversity	103,106	57,250	160,356	313,218	398,099	711,317	871,673
1.1. Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso Watershed	73,106		73,106	293,101			
1.2. Environmental education and community participation				20,118			
2. Development of sustainable activities in pilot areas	22,000	384,900	406,900	285,566	512,002	797,568	1,204,468
2.1. Development of alternative activities based upon the sustainable use and management of natural resources	22,000	364,900	386,900	251,125			
2.2 Capacity Building and Training in conservation and sustainable use of biological resources		20,000	20,000	34,441			
3. Project Management, Monitoring and Evaluation and Information Dissemination	163,341	0	163,341	376,126	266,680	642,806	806,147
3.1. Participatory project management and organization			0	235,483			
3.2. Project Inputs and Output Monitoring System				22,660			
3.3. Project Impact Monitoring System and Information Dissemination	143,472		59,530	86,864			
Activity 3.4. Project Outreach and Information Dissemination	19,869		19,869	31,119			
Total Implementation (I)	288,447	442,150	730,597	974,910	1,176,781	2,176,691	2,882,288
Total (PDF+I)	288,447	442,150	730,597	999,910	1,176,781	2,176,691	2,907,288

III. BUDGET

A summary of MSP project expenditures by type of expenditure is presented below. Detailed budget tables for GEF expenditure and counterpart funding are attached in Annex F.

Expenditure Category	GEF	GoB	Total
1. Investment Costs			
Equipment	220,231	56,500	276,731
Travel	156,600		156,600
Technical Assistance (TA)	79,116		79,116
Total Investment	455,947	56,500	512,447
2. Personnel Costs			
Total Personnel	69,525	1,093,912	1,163,437
3. Total Recurrent Costs	360,810	26,369	387,179
Total expenditure	886,282	1,176,781	2,063,063
Contingency	88,628		88,628
Total Implementation	974,910	1,176,781	2,151,691
PDF	25,000	25,000	50,000
TOTAL	999,910	1, 201,781	2, 201,691

IV. IMPLEMENTATION PLAN

The project management structure includes, at a higher level of hierarchy, a deliberative committee (PDC; see section D and Annex D) comprised of representatives from the municipality, state government, farmers associations, the project manager (PM) and other stakeholders. The PDC will foster effective communication between the different executing agencies.

Decision making with regard to the strategy and approaches for design and implementation of project activities will be made by this steering committee, based upon assessment of the feedback from local community stakeholders. This steering committee will resolve issues about the project, and assess project progress and impacts, based on technical support provided by the Technical Unit (TU).

Project Implementation Plan: Schedule of Activities and Milestones

	Year 1		Year 2		Year 3		Year 4	
Component 1. Participatory planning and management for the conservation and sustainable use of biodiversity								
Activity 1.1. Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso watershed								
Sub-activity 1.1.1. Formulation of the Formoso watershed management plan								
Sub-activity 1.1.2. Formulation of a strategy for integrated management of protected areas								
Sub-activity 1.1.3. Formulation of detailed watershed management plans for two critical micro-watersheds								
Sub-activity 1.1.4. Formulation of a regulatory framework for integrated watershed management and biodiversity conservation								
Activity 1.2. Environmental education and community participation								
Component 2. Development of sustainable activities in pilot areas								
Activity 2.1. Development of alternative activities based upon the sustainable use and management of natural resources								
Sub-activity 2.1.1. Implementation of the Support Center for Rural Activities and Agricultural Production								
Sub-activity 2.1.2. Transformation and use of organic solid residues								
Sub-activity 2.1.3. Development of pilot units of multifunctional land use								
Activity 2.2. Capacity Building and Training in conservation and sustainable use of biological resources								
Component 3. Project Management, Monitoring and Evaluation and Information Dissemination								
Activity 3.1 Participatory project management and organization:								
Activity 3.2. Project Input and Output Monitoring System								

Activity 3.3. Project Impact Monitoring System							
Sub-activity 3.3.1. Monitoring of soil and water indicators							
Sub-activity 3.3.2. Monitoring of terrestrial biodiversity indicators							
Sub-activity 3.3.3. Monitoring of social and economic indicators							
Activity 3.4. Project Outreach and Information Dissemination							

V. PUBLIC INVOLVEMENT PLAN

This section discusses the stakeholder participation plan and respective strategy for the execution of this proposed MSP. It includes (i) a description of the stakeholders who will be involved in the project, and (ii) how they will participate, with an outline of mechanisms and activities that are planned to sustain local participation, ensure information sharing, and feedback the monitoring and evaluation process.

A) Stakeholder Identification

Key stakeholders have been identified throughout the consultation process with Block A funding. An initial analysis of the local economic and institutional profile has identified 10 main groups as potential beneficiaries and/or partners of the project:

- a) Small-sized landowners carrying out subsistence farming, in some cases including cattle husbandry and/or tourism (148 properties, 54.6% of the total);
- b) Medium-sized landowners carrying out integration of cattle husbandry and agriculture (38 properties, 14% of the total);
- c) Medium-sized landowners integrating agriculture and/or cattle husbandry with tourism (16 properties, 6% of the total);
- d) Local groups and agencies related to tourism planning and development (39 properties, 14% of the total).
- e) International, national and local NGOs with relevant experience in the area or particularly engaged in thematic strategic fields such as organic agriculture, sustainable tourism, environmental education, agro-forestry, biodiversity conservation and others;
- f) Research Centers/Universities engaged in local research or potentially interested in joint activities with governmental and non governmental agencies;
- g) Recreational users including the tourism industry;
- h) Local commercial representatives who can contribute to the marketing and visibility of local products and services;
- i) Government agencies with relevant jurisdictions at national, regional and local levels;
- j) Association of Fish Farmers (Aquaculture).

These 10 groups are represented in one way or another on the Project Deliberative Committee (PDC), as presented in Annex D. A number of government agencies are already committed to project execution with the support of local NGOs and universities. The core government agencies that will execute the project are Embrapa, IDATERRA, SEMA and the Municipality of Bonito. They will engage different partners not only in participatory meetings and events but also in implementation procedures. Scientists from the Federal University of Mato Grosso do Sul and Dom Bosco Catholic University have committed themselves to participate in project implementation (agro-forestry and tourism, respectively).

A more detailed stakeholder analysis will be carried out during the project's first year as part of the "Formulation of the Formoso Watershed Management Plan" (Activity 1.1), which will allow eventual strategy adjustments and re-evaluations of target groups and partnerships.

B) Information Dissemination and Consultation

The project's general sustainability depends directly on a permanent information dissemination strategy and continuous consultation with local stakeholders.

Information will be continuously disseminated through meetings, seminars, workshops and different kinds of events involving the primary stakeholder groups and the general public. In addition, participatory monitoring and evaluation has been included as part of the project monitoring and evaluation process (see M&E Plan on Section VI). During the preparation workshop funded under the Block A, some of the key indicators of achievement were developed with stakeholders and have been included in the Logframe and M&E Plan. Local organizations, particularly the Municipality of Bonito, and one NGO will be co-responsible to the Project Manager and the Project Technical Coordinator for some of the monitoring activities, with Embrapa providing support and technical assistance as necessary. Key groups of stakeholders, particularly those small farmers living in the pilot micro-watersheds, will also participate actively in data collection and other sampling activities envisioned under both the formulation of micro-watershed management plans (Sub-activity 1.1.3), and the execution of soil, aquatic and terrestrial biodiversity monitoring planned under Activity 3.3.

The project will also consider the preparation and distribution of written material and local media alternatives such as radio and community-based information channels.

The “Environmental Education and Training in Community Participation” and “Project Outreach and Information Dissemination” will represent key activities of the project and will lead permanently to the dissemination of relevant information concerning environmental, social and economic aspects of regional development and citizenship-building issues. Educational campaigns and programs will be major tools for public awareness and project dissemination as they will be based upon local cultural values and consider not only formal but also informal activities involving the different target groups (see more details under Section I.D, Activities 1.2 and sub-activity 3.3.4).

Besides the dissemination of project information to the general public, an internal communication system will also be designed to link the main executing agencies, in order to avoid implementation gaps and lack of continuity. EMBRAPA will also design a homepage that will ensure project consultation by society as whole.

Technical reports are going to be produced by the main executing agencies and will be filed and made available for consultation during the entire project implementation period.

For the communication strategy, the project will contact qualified professionals or institutions in the first year of implementation and define the mechanisms to be adopted by the different executing agencies, in order to guarantee an efficient means of interaction and information exchange among themselves and between them and the general public.

C) Stakeholder participation strategy

Three methods for enhancing participation will be adopted by the project:

i) Capacity Building, which will be used both in training on particular technical subjects and in activities aimed at strengthening people's capacity to organize themselves and, to change and strengthen their own communities and institutions;

ii) Participatory Diagnosis and Studies (shared knowledge), mainly through the adoption of PRA “Participatory Rural Analysis” in various project activities, to enable stakeholders to define the problem and decide what needs to be found out in order to design solutions;

iii) Monitoring and Reviews, in partnership with the executing agencies;

iv) Communication, through the adoption of innovative methods that will also reach those who most need the project information and who are least likely to get it;

The adoption of these methods will contribute to achieve the common objectives and expected benefits of participation in project implementation, defined as: a) improving the efficiency, effectiveness, sustainability and coverage of the project, and b) promoting stakeholder capacity, self-reliance and empowerment.

The following paragraphs outline a number of project activities that somehow incorporate one or more of the aforementioned methods:

Workshops are planned in association with all project components, particularly under the planning and capacity building activities, allowing thus consultation, consensus-building and information sharing, update and exchange. The idea is to promote and encourage participation in the decision-making process through strengthening of local knowledge and behavioral changes towards natural resources protection and sustainable use.

Participation and public involvement is also contemplated by the Project Management Structure that predicts, besides the main executing agencies (Embrapa, IDATERRA, SEMA), a line of "Service Providers" (NGOs, Consultants, Universities and others) which guarantees stakeholders' participation at the level of project implementation. Stakeholder meaningful participation in decision-making activities is also envisioned through the representation of the ten above-mentioned key groups of stakeholders on the Project Deliberative Committee (PDC).

Under the sub-activity "Harmonization of existing regulatory framework for integrated watershed management and biodiversity conservation", a process will be started to increase popular participation in the enforcement system executed by SEMA in selected priority biodiversity areas of the Formoso Watershed, complemented by strengthening SEMA at the local level. Under Sub-activity 1.1.4, the project will establish a Complaint Center (within the SEMA Office in Bonito) where the local population can register complaints, specific reports of infringements of regulations and ideas for the improvement of environmental management. SEMA will then compile and publish these community contributions and take action where required.

The *Support Center for Rural Activities and Agricultural Production (CEPA)*¹, will also constitute a means to assure stakeholders involvement with the project, by providing operational assistance to local farmers in sustainable agriculture and other livelihood-enhancing activities, including indigenous technologies and crafts.

The education program on sustainable livelihood activities will be based on conservation agriculture and traditional knowledge, disseminating lessons acquired during watershed management planning and implementation of pilot units. This program will be targeted at the rural community of the Formoso watershed and will include demonstration visits to model farms and other relevant sites or institutions, fostering public involvement and assuring sustainability of Project outcomes.

As previously mentioned (see above section "b"), participatory monitoring and evaluation has been included in project design (see also and M&E Plan on Section VI).

The participation process will be additionally reinforced by the permanent presence of the local councils of Rural Development, Environmental Development and Tourism Affairs that will represent small farmers, rural workers, tourism groups, the private sector, municipal stakeholders and NGOs, among others, in the Project Deliberative Committee (PDC). This structure favors direct stakeholders participation in the project decision-making process.

The level of stakeholder participation is expected to be gradually enhanced by the progressive effects of the training and educational program and the multiplying effect of the sustainable activities that will be supported by the project.

¹ The center will be based at the plant nursery managed by the Municipality.

VI. MONITORING AND EVALUATION PLAN

The Project's Monitoring and Evaluation (M&E) plan is based on the establishment and monitoring of key input/output and impact indicators. The logframe table (Annex A) presents a summary of the M&E plan presented by project objective/component/outcome/activity/sub-activity, including the project timing of outputs and impact assessment (for timing, see indicator's column at Annex A). Finally, the table presented at the end of this section identifies the main reporting documents, timing and responsibility with regard to M&E reporting.

During the preparation workshop funded by Block A, some of the key indicators of achievement were developed with stakeholders and have been included in the Logical Framework and M&E Plan.

To the extent possible, the project monitoring and evaluation will use participatory mechanisms to enable stakeholders to share their feedback. One NGO will be co-responsible to the Project Manager and the Project Technical Coordinator for some of the monitoring activities, with Embrapa providing support and technical assistance as necessary. Key groups of stakeholders, particularly those small farmers living in the pilot micro-watersheds, will also participate actively in data collection and other sampling activities planned under Activity 3.3 to monitor trends in soil, aquatic and terrestrial biodiversity

The monitoring and evaluation plan will be refined and consolidated during the first months of project implementation. This will require a series of meetings and discussions among all representatives from the executing agencies and stakeholders, as well as Project Deliberative Committee (PDC) approval. As mentioned above, the Project Manager (PM) will be responsible for this activity, aided by the Project Technical Coordinator, and supported in the field by one NGO, farmers, the Municipality of Bonito and by a consultant with experience in formulating and implementing participatory M&E plans. With field support from the aforementioned stakeholders, project impacts will be monitored by the executing agencies responsible for sub-activities 3.3.1, 3.3.2, and 3.3.3 (soil and water/Embrapa Western, biodiversity/Embrapa Pantanal, and social-economy/Embrapa Soils, respectively), based on indicators broadly defined in the Project Logical Framework (Annex A) and "activities description" (section I.D).

Data gathered during the formulation of the Formoso Watershed Management Plan, as well as more detailed data necessary for micro-watershed planning (sub-activities 1.1.1 and 1.1.3, respectively), will constitute the baseline information for project impact monitoring.

Since evaluation is a combination of learning and accountability, the project manager, based on regular reports from the Project Technical Coordinator, will be responsible for evaluating the level of success of project administration, according to a schedule and using indicators set by the M&E plan and the Logical Framework.

Apart from progress reports that will be prepared once a year during project implementation, a completion paper will be prepared at the end of the project period, assessing progress against pre-set objectives and indicators. A consultant will aid in the definition and implementation of a participatory mechanism in order to enable stakeholders to share their feedback.

The Project Deliberative Committee which meets at least once a year will serve as an expert panel for judging the monitoring and evaluation plan implemented.

The Monitoring and Evaluation Plan was designed to guarantee engagement of stakeholders and local authorities, by providing them with the means to continue monitoring the project's outcomes after its completion.

Monitoring and Evaluation Reports

Report	Timing	Responsibility
Technical reports	Periodic	Consultants/contractors to submit to Technical Unit / PM /Embrapa
Semi-annual Progress Reports	7/31/2002	Embrapa
Annual Progress Reports	1/31/2003	Embrapa
Project POA (draft)	End of Fiscal Year	Embrapa
Mid-term Review	7/2004	World Bank
Project Completion Report	7/2006	World Bank and Embrapa

ANNEX A: PROJECT'S LOGICAL FRAMEWORK

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Project Goal</p> <p>The goal of the project is to contribute to the conservation and sustainable use of biodiversity of global importance in the Formoso Watershed.</p>	<ul style="list-style-type: none"> By the fourth year of the Project, the proportion of local stakeholders (Bonito municipality) who perceive biodiversity conservation and its sustainable use as part of the rural productive system increased by 50%. 	<p>Results from structured interviews and questionnaires and final reports.</p>	
<p>Project Purpose</p> <p>The purpose of the Project is to develop, disseminate and initiate the implementation of a participatory planning and integrated management strategy aimed at the conservation and sustainable use of biodiversity of global importance, including agro-biodiversity, and to promote the control of land degradation in the Formoso Watershed.</p>	<ul style="list-style-type: none"> An integrated management plan for the conservation and sustainable use of biodiversity of the Formoso watershed written and its implementation initiated, upon completion of the Project. At least 150 people, including community leaders, government and NGO staff trained in participatory environmental planning and management for the conservation and sustainable use of biodiversity in Bonito. Positive trends in the biodiversity (birds, plants, aquatic and soil organisms) and agro-biodiversity (crops, trees and domesticated animals) of two micro-watersheds over 3 years. A 25% increase in the soil cover percentage of two micro-watersheds year-round. A proposal for changes in the regulatory framework to facilitate the adoption of improved watershed management and integrated management of protected areas at the state and watershed/local levels developed and submitted to the authorities from the Legislative and Judiciary bodies 	<ul style="list-style-type: none"> Final project report. Training courses, programs and attendance lists Remote sensing data and field survey reports Remote sensing data 	<ul style="list-style-type: none"> Any bush fire that eventually occurs in the micro-watersheds where the project pilot units will be implemented is rapidly controlled by the local fire squad.

Specific Project Objectives	
<p>(i) Promote the strengthening of local environmental and agricultural institutions and communities, by providing them with land-use planning tools for the formulation and initial implementation of an integrated watershed management plan</p>	<ul style="list-style-type: none"> • (i) A watershed management plan prepared with the involvement of stakeholders, and capacity and involvement of local communities, private sector and institutions improved for the management of biodiversity in the upper/middle Formoso Watershed
<p>(ii) Promote the integrated management of existing public and private protected areas</p>	<ul style="list-style-type: none"> • (ii) A strategy for integrated protected areas management prepared with the involvement of local stakeholders, encompassing the whole Formoso watershed, and its results incorporated into the aforementioned watershed management plan
<p>(iii) support the implementation of sustainable livelihood activities on a pilot and demonstrative basis that would serve to reduce pressure on key natural resources, and rehabilitate natural habitats, particularly riparian and savannah-like vegetation</p>	<ul style="list-style-type: none"> • (iii) Two to three selected pilot and demonstrative sustainable activities implemented in the middle/upper Formoso watershed

Project Outcomes (Outputs)	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>A. An integrated watershed management plan developed with stakeholders for the entire Formoso watershed, complemented by the development and initial implementation of two detailed plans for critical micro-watersheds, and with the inputs from a project-supported strategy for integrated management of protected areas, and an improved/harmonized regulatory framework</p>	<ul style="list-style-type: none"> • A management plan for the entire Formoso Watershed written and approved by local communities, private sector and the Project Deliberative Committee (PDC), 24 months after commencement of the Project (scale of 1:100,000). • Detailed plans for the sustainable use and conservation of biodiversity of two micro-watersheds written and approved by local communities, landowners, and the PDC, 18 months after commencement of the Project (scale of 1:25,000). • A strategy for the management of protected areas written and approved by local communities, private sector and the Project Deliberative Committee, and implementation in pilot areas initiated within 36 months of the commencement of the Project. • Existing federal, state and municipal legislation regarding biodiversity conservation revised and evaluated 12 months after the commencement of the Project, so as to subsidize the preparation of Management Plans. An Environmental Complaint Center established in Bonito, by Project completion, to promote community participation in legislation enforcement. • Number of laws and regulations drafted with the involvement of local stakeholders 	<ul style="list-style-type: none"> • Project progress and final reports. 	<ul style="list-style-type: none"> • Local community is willing to participate in the environmental planning and management process. • Baseline information required for the planning process delivered in a timely manner by government agencies and NGOs that do not participate of the Project • Landowners are willing to implement private protected areas on their properties. • State and federal governments maintain their Private Natural Reserve Programs.
<p>B. Sustainable development and integrated ecosystem management training and education program for community members developed and implemented, and project staff from relevant agencies trained to integrate biodiversity management concepts into their routine</p>	<ul style="list-style-type: none"> • Two courses and two participatory workshops implemented in Bonito during the first 30 months of the Project, involving local stakeholders, potential disseminators and community "awareness providers." • Three seminars implemented in Bonito during the first 18 months of the Project, involving staff from executing agencies and farmers, so as to standardize Project concepts and methodologies. 	<ul style="list-style-type: none"> • Seminars, courses and workshop programs and attendance lists. 	<ul style="list-style-type: none"> • Community members and project staff are willing to accept, internalize and adopt the conceptual framework of the Project.

<p>C. Pilot sustainable activities implemented and results disseminated, to serve as a model for reducing pressure on key natural resources</p>	<ul style="list-style-type: none"> Two to three selected, sustainable activities implemented in pilot areas of the middle/upper Formoso Watershed, 36 months after the commencement of the Project. Number of plant and animal species (wild and domesticated) on model farms increased at least 20% by Project completion. At least 6 field courses held on model farms during the third and final years of the Project, training 80 local farmers and extension workers on sustainable rural livelihood options. Publication of a document summarizing lessons learned and discussion of this document at a state-level seminar 	<ul style="list-style-type: none"> Project progress reports and final report. Field surveys and final report. Course attendance lists. 	<ul style="list-style-type: none"> Landowners of pilot areas are committed to achieving the Projects objectives
<p>D. Project management structure established and functioning, lessons learned, and watershed model disseminated to other parts of the country and internationally</p>	<ul style="list-style-type: none"> A detailed participatory M&E plan refined and consolidated, and approved by local communities, landowners and the PDC, during the initial 6 months of the Project. Project inputs and outputs evaluated annually, to monitor project progress. Data on socio-economic variables, biodiversity, soil and water quality from two pilot areas collected and analyzed annually, to monitor project impact on biodiversity and sustainability of economic activities Project results documented and disseminated locally, nationally, and internationally 	<ul style="list-style-type: none"> Reports from project management and evaluation activities 	<ul style="list-style-type: none"> Experiences, lessons learned and watershed model developed will be relevant to other parts of Brazil.
<p>E. Monitoring and evaluation program established and project dissemination strategy formulated and implemented.</p>	<ul style="list-style-type: none"> First Project Progress report. Project progress reports. Field surveys and questionnaires (see details in Annex C). 	<ul style="list-style-type: none"> First Project Progress report. 	
<p>Project activities to achieve outcomes</p>		<p>Means of Verification</p>	<p>Important Assumptions</p>

<p>Component 1:</p> <p>Activity 1.1. Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso Watershed</p> <p>Sub-activity 1.1.1. Formulation of the Formoso watershed management plan</p> <p>Sub-activity 1.1.2. Formulation of a strategy for integrated management of protected areas</p> <p>Sub-activity 1.1.3. Formulation of detailed watershed management plans for two critical micro-watersheds</p> <p>Sub-activity 1.1.4. Harmonization of existing regulatory framework for integrated watershed management and biodiversity conservation</p> <p>Activity 1.2. Environmental education and community participation</p>	<p>1.1.1. Formoso watershed management plan formulated with appropriate community participation, and endorsed by the Project Deliberative Committee and other relevant local stakeholders</p> <p>1.1.2. Strategy for integrated management of protected areas formulated and endorsed by the Project Deliberative Committee and other relevant local stakeholders, including identification and characterization of planned public and existing private PAs; identification of areas potentially indicated for protection; and identification and implementation of corridors connecting public and private PAs in one or more pilot areas</p> <p>1.1.3. Two detailed management plans for critical micro-watershed formulated and approved by community members</p> <p>1.1.4. Regulatory measures drafted to incorporate biodiversity conservation and integrated watershed management concepts</p> <p>1.2. Six courses and participatory workshops implemented during the first 30 months, directed to community awareness providers (community leaders, schoolteachers, and tourism guides), with the participation of at least 180 local people.</p>
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<p>Component 2:</p> <p>Activity 2.1. Development of alternative activities based upon the sustainable use and management of natural resources</p> <p>Sub-activity 2.1.1. Implementation of the Support Center for Rural Activities and Agricultural Production</p> <p>Sub-activity 2.1.2. Transformation and use of organic solid residues</p> <p>Sub-activity 2.1.3. Development of pilot units of multifunctional land use</p> <p>Activity 2.2. Training program on conservation and sustainable use of biological resources</p> <p>Component 3:</p> <p>Activity 3.1. Participatory project management and organization:</p> <p>Activity 3.2. Project Inputs and Output Monitoring System</p> <p>Activity 3.3. Project Impact Monitoring System</p> <p>Sub-activity 3.3.1. Monitoring of soil and water indicators</p> <p>Sub-activity 3.3.2. Monitoring of terrestrial biodiversity indicators</p> <p>Sub-activity 3.3.3. Monitoring of social and economic indicators</p> <p>Activity 3.4. Project Outreach and Information Dissemination</p>	<p>2.1.1. The Support Center for Rural Activities and Agricultural Production established and implemented</p> <p>2.1.2. Organic solid residues collected in Bonito and analyzed periodically; a 30% increase in the adoption of organic farming in the region's subsistence crops</p> <p>2.1.3. Two to three sustainable activities implemented in model farms located in critical micro-watersheds during the first 36 months of the project</p> <p>2.2. Six seminars (implemented during the first 18 months, directed to at least 50 project participants, among the following: executing agencies staff, community leaders and small farmers; at least 6 field courses on alternative sustainable activities held on model farms; at least 150 farmers trained on biodiversity conservation and integrated watershed management</p> <p>3.1. The Project Deliberative Committee (PDC) and Technical Unit established and implemented</p> <p>3.2. Project reports prepared by the Project Technical Coordinator and analyzed by the PDC annually, and upon completion of the Project</p> <p>3.3.1. Soil biological, chemical and physical indicators evaluated before, during and after implementation of pilot sustainable activities; monitoring results published in bulletins and available on the project website</p> <p>3.3.2. Bird diversity and vegetation cover evaluated before and after implementation of pilot sustainable activities; monitoring results published in bulletins and available on the project website</p> <p>3.3.3. Simulations of profit margins carried out in model farms where pilot activities will be implemented, and socio-economic data of properties surveyed during the PDF-A phase updated upon completion of the project; questionnaires applied to evaluate changes in environmental perception of land users</p> <p>3.4. Project website developed; Project initiatives, results and impacts disseminated through the project website, newsletters, bulletins and workshops.</p>
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ANNEX B: COMPLEMENTARY DATA COLLECTION FOR THE FORMULATION OF WATERSHED MANAGEMENT PLANS

1. Data Collection and Analysis for the Formulation of the Formoso Watershed Management Plan

a) Data collection

This stage consists of the compilation of existing information (maps, statistical records, bibliographic data, etc.) and field surveys to fill the gaps. An analysis of the diagnostic and the workshop held during the PDF-Block A phase shows that most of the necessary information is unknown in the Formoso River basin, on a proper scale for land-use planning and biodiversity conservation. Therefore, the following themes will be surveyed on the scale of 1:100.000:

- Current use and vegetation – based on satellite imagery, complemented by field surveys, the vegetation will be classified and mapped accordingly, identifying the potential vegetation, the current vegetation, and the areas with human activities. (*Responsibility: Embrapa Beef Cattle and Embrapa Soils*)
- Soil – one of the most important determinants of vegetation and, of course, of the associated biodiversity, the soils of the Formoso River basin will be classified and mapped on a scale of 1:100.000. (*Responsibility: Embrapa Soils*)
- Fauna (fish) – occurrence and distribution of: 1) species of economic interest (ornamental fish species, edible fish species); 2) species during the *piracema* (reproductive period). (*Responsibility: Embrapa Pantanal*)
- Flora (terrestrial and aquatic plants) - occurrence and distribution of key species (endemic, rare, threatened) that correlate to the main vegetation types occurring in the Formoso River basin (*Responsibility: Embrapa Beef Cattle*)
- Geology – the region presents the occurrence of subsidence phenomena, due to the subsoil calcareous nature. These fragile zones will be mapped. (*Responsibility: consultant*)
- Geomorphology – the functional approach will be adopted, considering the diversity of landscapes in the area (*Responsibility: consultant*)
- Protection Areas – the private natural reserves, conservation units, and legally enforced reserves and protected zones will be diagnosed and mapped. The economic activities that impact the protection areas will also be identified and mapped. (*Responsibility: SEMA-MS*)
- Social and economic attributes – the properties surveyed during the diagnosis of the PDF-Block A phase (approximately 20% of the whole basin) will be geo-referenced and the information added to the database. Additional information needed for land-use planning will be surveyed in a selected sample of properties. The database will provide social, economic, demographic, political and infrastructure indicators. (*Responsibility: Embrapa Soils*)
- Climate – There are no meteorological stations in the Formoso watershed. Therefore, the less variable atmospheric data (temperature, atmospheric pressure) will be acquired from the existing meteorological stations in the region (*Responsibility: Embrapa Soils*).

b) Data Analysis (*Responsibility: Embrapa Soils*)

This stage consists of spatial analyses of the information in the database, defining the *landscape units* of the area. These are the combination of physical, biological, and human aspects. Correlation analyses will allow the definition of:

- the level of vulnerability of the different landscape units;

- the *human development potential*, taken from the social and economic data;
- *sustainability of the landscape unit*, estimated from the correlation of human development potential with the level of vulnerability. This parameter indicates the level of environmental threat derived from current land use;
- *land use potential*, mainly tourism, agriculture, agro-forestry, and sustainable use of native species;
- *land-use efficiency*, correlation between *land use potential* and current land use;
- *environmental quality* derived from the above indices.

2. Data Collection for the Formulation of the Detailed Action Plans for Critical Micro-watersheds

A micro-watershed action plan requires information on a larger scale than that needed for the management of entire watershed. Therefore, data complementary to the GIS database (activity 1.1.3.1) will be collected and mapped on a scale of 1:25.000. These will consist of:

- Survey and interpretation of the physical environment (*Responsibility: Embrapa Soils*);
- Social and economic survey (census) (*Responsibility: Embrapa Soils*);
- Survey of the environmental perception of local stakeholders (*Responsibility: Embrapa Soils*);
- **Fauna** (birds, mammals) – occurrence and distribution of: 1) endemic, rare and threatened species; 2) species of scenic value. (*Responsibility: Embrapa Pantanal*);
- **Flora** (terrestrial and aquatic plants) - occurrence and distribution of: 1) endemic, rare and threatened species; 2) species of ecological interest (plants that exhibit a high correlation with fauna diversity); 3) species of economic interest (fruit trees or shrubs with high potential for sustainable use in agro-forestry systems, or as an aide in the recovery of degraded lands).(*Responsibility: Embrapa Beef Cattle*);
- Distribution of rural properties (*Responsibility: Bonito municipality*);
- Distribution of water supplies for animals (mainly cattle) (*Responsibility: Bonito municipality*);
- Distribution of disposal sites for disposal of agrochemical recipients, solid and liquid residues (*Responsibility: Bonito municipality*);
- Distribution of water supplies for agrochemical sprayers (*Responsibility: Bonito municipality*);
- Vulnerability of roads to erosion processes (*Responsibility :IDATERRA*)

The above-mentioned data on the watersheds will constitute a subset of the GIS, such as a zoom of the original system. Upon a preliminary analysis of the data, the following actions will be considered:

- selection of *model farms* for the implementation of the *pilot units* envisaged by component 2. From this moment the landowners of the *model farms* will take part in all planning activities (*Responsibility: multi-institutional*);
- design of the spatial layout of the proposed activities on the *model farms* (*Responsibility: multi-institutional*);
- market analyses of the possible components of the farming systems proposed (agroforestry, fruits, native species, etc.) (*Responsibility: IDATERRA*);
- cost-benefit analysis of the proposed farming systems (*Responsibility: IDATERRA*);
- selection of the most suitable soil management technologies, crop rotation schemes and plant species to take part in the agroforestry scheme, etc. (*Responsibility: multi-institutional*);
- participatory workshops to ensure sustainability of the interventions and increase the level of adoption of the sustainable practices to be implemented (*Responsibility: multi-institutional*).

ANNEX C: DESCRIPTION OF POTENTIAL ECONOMIC ACTIVITIES

Component 2 will support the development of alternative activities for communities living in two pilot micro-watersheds chosen for their particular importance in terms of biodiversity, which will improve conservation as well as sustainable use of natural resources and at the same time increase the welfare of participating communities. Three activities will be carried out under this Activity:

1. Implementation of the Support Center for Rural Activities and Agricultural Production

This Activity includes the organization and implementation of a *Support Center for Rural Activities and Agricultural Production* in Bonito. This will be a physical structure to provide support to the field activities of the Project. It will be based on the plant nursery managed by the Municipality. The current structure is very weak and will be strengthened to support the activities of agroforestry, recovery or enrichment of degraded riparian forests, processing of organic residues, incubators for free-range chickens, and food-processing facilities. The Support Center will be coordinated by the local project manager (staff from the Municipality of Bonito), aided by the coordinator of component 2 (IDATERRA).

The Bonito Municipality will supply as its counterpart the salaries of one agronomist, one secretary, four staff workers, one truck, and the infrastructure for the chicken egg incubators.

2. Transformation and Use of Organic Solid Residues

According to the concepts of agro-ecology and the objective of promotion of agricultural activities associated with biodiversity conservation, this activity will be directed towards the rational use of the organic residues produced in Bonito, both in the rural and urban areas. The residues already available in the region, if properly processed and applied, can reduce to a minimum the use of synthetic fertilizers, reducing production costs and water pollution.

Laboratory tests and analyses will be carried out to enable production and distribution of organic or organo-mineral composts to be used as fertilizers on the *model farms*.

The GEF increment will improve the infrastructure of the laboratory facilities of IAGRO, the state institution responsible for supporting farmers in the analyses of organic residues and supplying the necessary information for the production of composts and the design of field application strategies by the farmers. This activity is essential to support the establishment of organic agricultural activities in the pilot units, and disseminating organic technology to the farmers in the region.

As its counterpart, IAGRO will offer salaries and laboratory infrastructure.

3. Development of pilot units of Multifunctional Land Use

The pilot units will be implemented on *model farms* located in critical micro-watersheds identified during the PDF-Block A. The activities will be implemented jointly with the landowners, to ensure their commitment and continuity after the project's termination. The pilot units will be designed to increase the multifunctionality of rural areas, enhancing agro-biodiversity and income, and reducing the land degradation processes. The following activities are being envisaged:

- *Agroforestry Systems*

This activity is at the heart of a multifunctional strategy. It is based in the optimization of the ecological and economic interactions and potentialities among its various components: timber species, crops, pastures, cattle, etc. Its objectives are to obtain improved yields and greater sustainability in the long term, promote biodiversity conservation, and improve the quality of life of rural families. The following agro-forestry systems will be considered:

- *Simultaneous systems* – Continuous interactions of annual and perennial crops, timber trees, fruit trees, multiple-use trees, and cattle, in a way that both forest and crops are always present on the same land unit.
- *Live fences and wind barriers* – Hedges of trees that may constitute the property's borders or protect other components of the system.
- *Small-Scale Fruit Production*

The project will aim to promote the integration of fruit orchards into the multifunctional farms. It will be implemented following the principles of agro-ecology, considering conservation of biodiversity, and should constitute an added tourist attraction. There is a potential internal market for fresh fruits in Bonito, due to the intense tourist activity, and also for homemade fruit-derived products, such as jellies, fruit bars, sweets, etc.

- *No-tillage Integrated Farming Systems*

The diagnostic made during the PDF-Block A phase revealed that most of the annual crops produced in Bonito were carried out under conventional soil management, causing severe problems of erosion and soil degradation. This activity will promote the adoption of no-tillage practices and the integration of pastures and crops, with the latter serving as soil cover to the former. This procedure aims at increasing soil biodiversity and carbon sequestration and simultaneously reducing energy inputs into the system.

- *Pasture Recovery and Management of Shallow Soils*

One of the main causes of land degradation observed in the Formoso watershed is inadequate management of grazing land. This activity will implement conservation technologies for the recovery of degraded pastures, enhancing soil protection and reducing the conversion rates of native vegetation to pastures.

- *Apiculture*

Model apiaries will be implemented on the *model farms*, exploring the diversity of local flora (forests, cerrados, riparian forests), as well as agro-biodiversity (fruit orchards, grasslands, etc.) for the production of honey and its derivatives, to be sold on both local and external markets.

- *Free-Range Chickens*

This activity will implement a system for the husbandry of free-range chickens, aiming at the production of eggs and meat, which can either be processed or sold fresh.

- *On-Farm Food Processing*

Its main objective is to confer added value to locally produced agricultural goods, as well as to promote employment on the farms, reducing the job deficit and poverty in the municipality.

This activity should also contribute to the development of sustainable tourism by providing locally-produced and organic agricultural produce as an added attraction.

- *Rural Tourism*

This activity will promote rural tourism as an additional source of income for the farms, and facilitate the integration of farm-based tourism into the tourism development strategy in Bonito.

ANNEX D: THE PROJECT'S MANAGEMENT COMPONENT

Project management will be under the overall responsibility of Embrapa which will appoint a Project Manager (PM) under the direct responsibility of the Embrapa Soils unit. Financial and Technical Units for the implementation of specific project activities (see Table 1) will assist the PM.

A Project Deliberative Committee (PDC) with representatives of major stakeholders will ensure full stakeholder participation in project management decisions, and oversee project implementation. The PDC will have responsibility for: 1) approving overall project design, budgets and progress reports; and 2) the resolution of any potential inter-institutional disagreement or conflict regarding project implementation. Specifically, the PDC will be responsible for approving annual work programs, budgets, the monitoring and evaluation system, reports to be presented to the GEF and the Bank, and for any adjustments in project design or procedures, as a result of the internal monitoring and evaluation system. The PDC will meet at least twice a year.

This Committee will be comprised of one elected representative of each of the following groups/organizations: farmers; municipal stakeholders; NGOs; Local Rural Development Council (CMDR); Local Environmental Development Council; the Local Council of Tourism Affairs; and the municipal government. Representatives from federal (Embrapa) and State (SEMA and IDATERRA) governments and from Universities will also participate in this Committee.

Each of the organizations involved will nominate its representative member to the PDC who must have an adequate level of decision-making power within the respective organization, given the fact that this will be a deliberative committee. The composition of this Committee will be as follows:

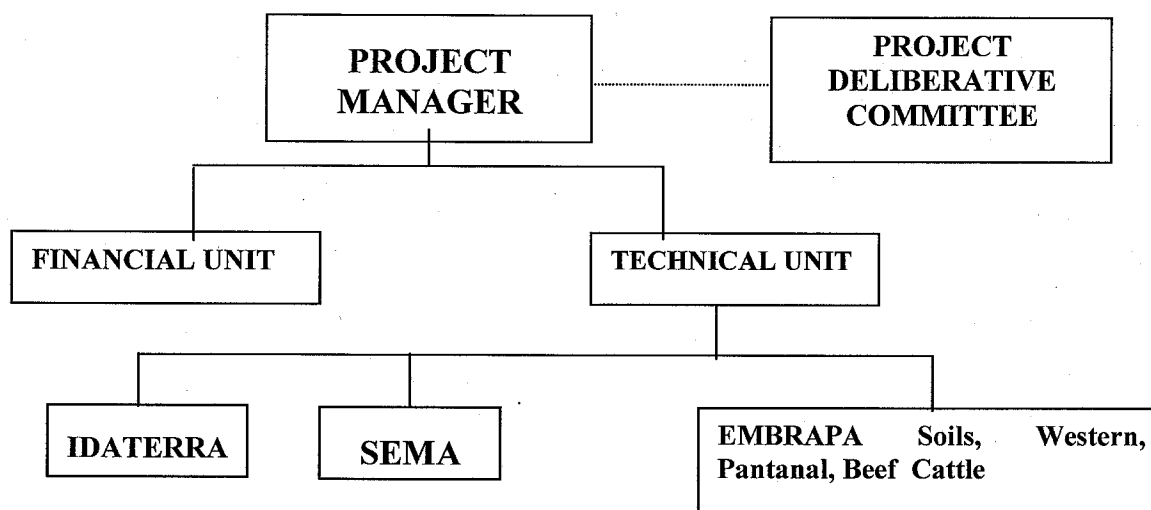
- One representative of the Bureau of EMBRAPA-Soils.
- The Director of Environmental Planning under the State Secretariat of Environment (SEMA)
- A Director of the State Agricultural Research and Extension Corporation (IDATERRA-MS)
- The Mayor of Bonito Municipality
- The Head of the local Rural Development Council (CMDR)
- The Head of the local Council of Tourism Affairs (COMTUR)
- The Head of one of the three existing local NGOs
- One representative of the local Universities

The Project Manager (PM), to be appointed by EMBRAPA Soils, will be responsible for overall project management and implementation and will act as the Secretary of the PDC, providing detailed information when and as required, and being responsible to ensure that the decisions/recommendations emanating from the Committee are implemented.

The Technical Unit

Day-to-day co-ordination will be done through the Technical Unit under the leadership of a full-time Technical Project Coordinator, appointed to follow up on day-to-day project implementation activities. The coordinator will work closely with representatives of each of the implementing agencies responsible for specific components/activities (i.e., SEMA-MS, IDATERRA, Embrapa). The Project Technical Coordinator will report to the Project Manager (PM) with whom he will work closely. He will be contracted on a full-time basis by the project and will provide local administrative support to the executing teams and work in close coordination with representatives of each of the executing agencies, to whom he will provide day-to-day technical and local administrative support.

Table 1. Schematic Project Management and Coordination Structure



The Financial Unit

Fundação Andre Tosello (FAT), the private foundation which is co-executing this MSP project to the GEF, was selected due to its significant experience in handling financial aspects (disbursements, procurement, and accountancy) of environmental projects, its proven capacity to deal with the World Bank's financial and procurement procedures, and its having an ongoing agreement with Embrapa that enables its engagement as the financial arm of any project coordinated by Embrapa. The Foundation will sign a contract with Embrapa who will sign a specific subsidiary Grant Agreements with GEF, and also with IDATERRA, SEMA, and Bonito Municipality, as a condition of Grant Effectiveness, laying down responsibilities and obligations of each part.

The involvement of a private Foundation to manage project finances, accounts, procurement and disbursements has proven to be an effective and efficient system in the implementation, by Embrapa, of the World Bank-financed AGTEC project (PRODETAB), ensuring a flexible implementation of its different subprojects. FAT will provide support to the project's financial administration, including: accounting, flow of funds, disbursements, procurement and contracts, travel support, and other related activities.

Financial resources from the World Bank/GEF, and eventual counterparts, will be administrated by FAT, who will also be responsible for preparing the disbursement requests for World Bank/GEF resources under supervision and responsibility of Embrapa. A specific contract will be signed between Embrapa Soils and FAT, after Grant effectiveness. Disbursements will be done in annual tranches based on application plans consistent with the Project Implementation Plan and approved by the World Bank/GEF and the PDC. Disbursement requests and justifications to the World Bank/GEF will be the responsibility of FAT, previously authorized by the PM.

The PM and FAT will be responsible for ensuring full compliance with the conditions of the Grant Agreement and the approved project. They will be responsible for the preparation of the POAs and play a key role in identifying the financial needs and administrative services required by the implementing entities of the project.

D.1 - MANAGERIAL ACTIVITIES AND RESPONSIBILITIES

PROJECT DELIBERATIVE COMMITTEE

- Oversee overall project implementation
- Analyze and approve the contract to be signed with the private foundation as well as the other partners of the project
- Analyze and approve the annual work programs
- Analyze and approve the disbursement plans
- Consider and approve the monitoring and evaluation system, plan and reports
- Promote institutional partnership and the overall technical and administrative cooperation in the framework of the institutions involved in project implementation
- Manage potential inter-institutional disagreements or conflicts regarding project implementation

PROJECT MANAGER

- Oversee overall project implementation to ensure that this is managed and implemented in accordance with the Grant Agreement
- Maintain fluid and constant communication and information with the Bank and GEF, and to respond to the requirements of these two institutions
- Oversee the contracts to be signed between the World Bank/GEF and EMBRAPA, and between EMBRAPA and the private foundation
- Oversee the subsidiary grant agreements to be signed with SEMA and IDATERRA
- Act as the Executive Secretary to the Project Deliberative Committee, organize quarterly meetings, keep them fully informed on project implementation, and oversee full compliance of the committee's recommendations
- Provide technical and administrative support to the Project Technical Coordinator and partner executing teams
- Approve the annual work programs, budgets, monitoring and evaluation and progress reports prior to submission to the PDC
- Approve all reimbursement applications to be submitted to the Bank, and being prepared by the private foundation
- Maintain a constant and fluid contact with the Directors of the partner institutions and the leaders of Local Farmer Associations and the Municipality
- Ensure compliance with the project's monitoring and evaluation system
- Prepare annual project reports

2. TECHNICAL PROJECT COORDINATOR

- Ensure compliance with the Grant Agreement and full implementation of the recommendations of the PDC
- Give technical and administrative support to the teams involved in project implementation
- Resolve, or seek assistance from the PM or PDC to assist in resolving, any inter-institutional conflict or deficiency affecting the harmony of project implementation
- Act as liaison between the implementing agencies and the private foundation responsible for project financing
- Provide logistical conditions to the project technical teams, according to instructions from the person responsible for each component of the project
- Act as liaison between the municipality, PM, PDC, and leaders of local farm associations as well as project beneficiaries (farmers, agro-industrialists, tourism agents and so on)
- Work with PDC to ensure full integration of the institutions involved in project implementation

- Prepare two project reports per year.
- Together with implementing teams and PM:
 - (i) review and endorse annual operating plans, integrated training plans, procurement plans, progress reports, TORs for special studies, etc. prior to submission to the PDC;
 - (ii) review microcatchment development plans and implementation programs, TORs for environmental studies, and for research and extension activities;
 - (iii) coordinate and monitor the technical activities carried out by all partner organizations operating in the project (Executing Agencies, NGOs, Universities)
 - (iv) supervise the consultants' activities vis-à-vis their terms of reference

D.2 - INSTITUTIONAL RESPONSIBILITIES

Component 1: Participatory planning and management for the conservation and sustainable use of biodiversity (*Responsibility: SEMA-MS*)

Activity 1.1. Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso Watershed (*Responsibility: Embrapa Soils*)

Sub-activity 1.1.1. Formulation of the Formoso watershed management plan (*Responsibility: Embrapa Soils*)

Sub-activity 1.1.2. Formulation of a strategy for integrated management of protected areas (*Responsibility: SEMA-MS*)

Sub-activity 1.1.3. Formulation of detailed watershed management plans for two critical micro-watersheds (*Responsibility: Embrapa Soils*)

Sub-activity 1.1.4. Formulation of a regulatory framework for integrated watershed management and biodiversity conservation (*Responsibility: SEMA-MS*)

Activity 1.2. Environmental education and training in community participation (*Responsibility: SEMA-MS*)

Component 2: Development of sustainable activities in pilot areas (*Responsibility: IDATERRA*)

Activity 2.1. Development of alternative activities based upon the sustainable use and management of natural resources (*Responsibility: IDATERRA*)

Sub-activity 2.1.1. Implementation of the Support Center for Rural Activities and Agricultural Production (*Responsibility: IDATERRA*)

Sub-activity 2.1.2. Transformation and use of organic solid residues (*Responsibility: IDATERRA*)

Sub-activity 2.1.3. Development of pilot units of multifunction land use (*Responsibility: IDATERRA*)

Activity 2.2. Training program on conservation and sustainable use of biological resources (*Responsibility: IDATERRA*)

Component 3: Project Management, Monitoring and Evaluation and Information Dissemination (*Responsibility: Embrapa Soils*)

- Activity 3.1. Participatory project management and organization (*Responsibility: Embrapa Soils*)
- Activity 3.2. Project Inputs and Output Monitoring System (*Responsibility: Embrapa Soils*)
- Activity 3.3. Project Impact Monitoring System (*Responsibility: Embrapa Pantanal*)
- Sub-activity 3.3.1. Monitoring of soil and water indicators (*Responsibility: Embrapa Western*)
- Sub-activity 3.3.2. Monitoring of terrestrial biodiversity indicators (*Responsibility: Embrapa Pantanal*)
- Sub-activity 3.3.3. Monitoring of social and economic indicators (*Responsibility: Embrapa Soils*)
- Activity 3.4. Project Outreach and Information Dissemination (*Responsibility Embrapa Soils*)

SPECIFIC ACTIONS	RESPONSIBILITY	DEADLINE
1. To conduct a project impact evaluation	Embrapa Soils	6 months before project completion
2. Final report of project evaluation	Embrapa Soils	6 months after project completion
3. Preparing a general management plan for the conservation and sustainable use of biodiversity	SEMA	6 months after the beginning of the project
4. Beginning the implementation of the general plan of conservation and sustainable use of biodiversity	SEMA	7 months after the beginning of the project
5. Training 50 people in participatory environmental planning and sustainable land protection of biodiversity	EMPAER, SEMA	6 months after the beginning of the project
6. Establishing a remote system of data collection for field operation	Embrapa Soils	6 months after the beginning of the project
7. Collecting information and preparing field reports	EMPAER	12 months after the beginning of the project
8. Writing a management plan for the entire Formoso watershed	Embrapa Soils	24 months after the beginning of the project
9. Approving the management plan	Deliberative Committee	28 months after the beginning of the project
10. Writing the detailed plans for the sustainable use and conservation of biodiversity of two micro-watersheds	Embrapa Soils	20 months after the beginning of the project
11. Approving the detailed plans for the micro-watershed	Deliberative Committee	24 months after the beginning of the project
12. Revising federal, state and municipal biodiversity legislation	SEMA	24 months after the beginning of the project
13. Establishing an Environmental Complaint Center	SEMA	24 months after the beginning of the project
14. Writing a strategy for management of protected areas	SEMA	36 months after the beginning of the project
15. Approving the strategy for management of protected areas	Deliberative Committee	40 months after the beginning of the project
16. Begin implementing, in the pilot areas, the strategy	SEMA	

for management for protected areas		40 months after the beginning of the project
17. Planning and implementing 2 courses and 2 participatory workshops	Embrapa Soils EMPAER, SEMA	24 months after the beginning of the project
18. Monitoring water biodiversity in 2 critical micro-catchments	Embrapa Pantanal SEMA	12 months after the beginning of the project
19. Planning and implementing three seminars involving local stakeholders, potential disseminators and community awareness providers	EMPAER	12 months after the beginning of the project
20. Planning and implementing three selected economic activities in the pilot areas of the middle/upper Formoso Watershed	EMPAER Embrapa Western	48 months after the beginning of the project
21. Planning and implementing field surveys for evaluation of the increase in number of plant and animal species	Embrapa Pantanal Embrapa Beef Cattle	48 months after the beginning of the project
22. Preparing and implementing 6 field courses for 80 trainees from local farms	EMPAER	Last year of the project
23. Writing a detailed participatory monitoring, progress and evaluation plan	Embrapa soils	6 months after the beginning of the project
24. Approving the monitoring and effect evaluation plan	Deliberative Committee	8 months after the beginning of the project
25. Preparing reports from project monitoring and effect evaluation	Embrapa Soils	Last three months of each year of project implementation
26. Preparing and implementing a socio- economic assessment	EMPAER Embrapa Soils	First and last years of the project
27. Collecting and analyzing data on biodiversity, soil and water quality	Embrapa Pantanal Embrapa Soil Embrapa Western Embrapa Beef Cattle SEMA	Annually

ANNEX F.1 INCREMENTAL COST AND BASE LINE

Component	Activity	Sub-Activity	Incremental Costs	Baseline Description	Baseline Costs	Total Costs
1. Participatory planning and management for the conservation and sustainable use of biodiversity	1.1. Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso watershed	1.1.1. Formulation of the Formoso Watershed Management Plan	73,020	a) Project Flora – MS (CNPq/Embrapa Gado de Corte)	7,892	
				b) Project Ecology of Birds and Mammals in the High Paraguay River Basin (FUNDECT/Embrapa Pantanal)	13,661	94,573
		1.1.2. Formulation of a strategy for integrated management of protected areas.	66,176	a) Promotion for the Creation of Private Reserve Programme – SEMA budget	15,000	
				b) Proteccion and Recovery of Legally Protected Areas – SEMA budget	15,000	96,176
		1.1.3. Formulation of detailed watershed management plans for two critical micro-watersheds	107,599	a) Project Flora – MS (CNPq/Embrapa Gado de Corte)	7,892	
				b) Project Ecology of Birds and Mammals in the High Paraguay River Basin (FUNDECT/Embrapa Pantanal)	13,661	129,152
		1.1.4. Harmonisation of existing regulatory framework for integrated watershed management and biodiversity	46,306	a) Impacting Activities Licensing System – SEMA budget	15,000	

ANNEX E

Figure 1 – Location of the Project Area (Formoso Watershed) in the High Paraguay River Basin, Mato Grosso do Sul, Brazil, South America.

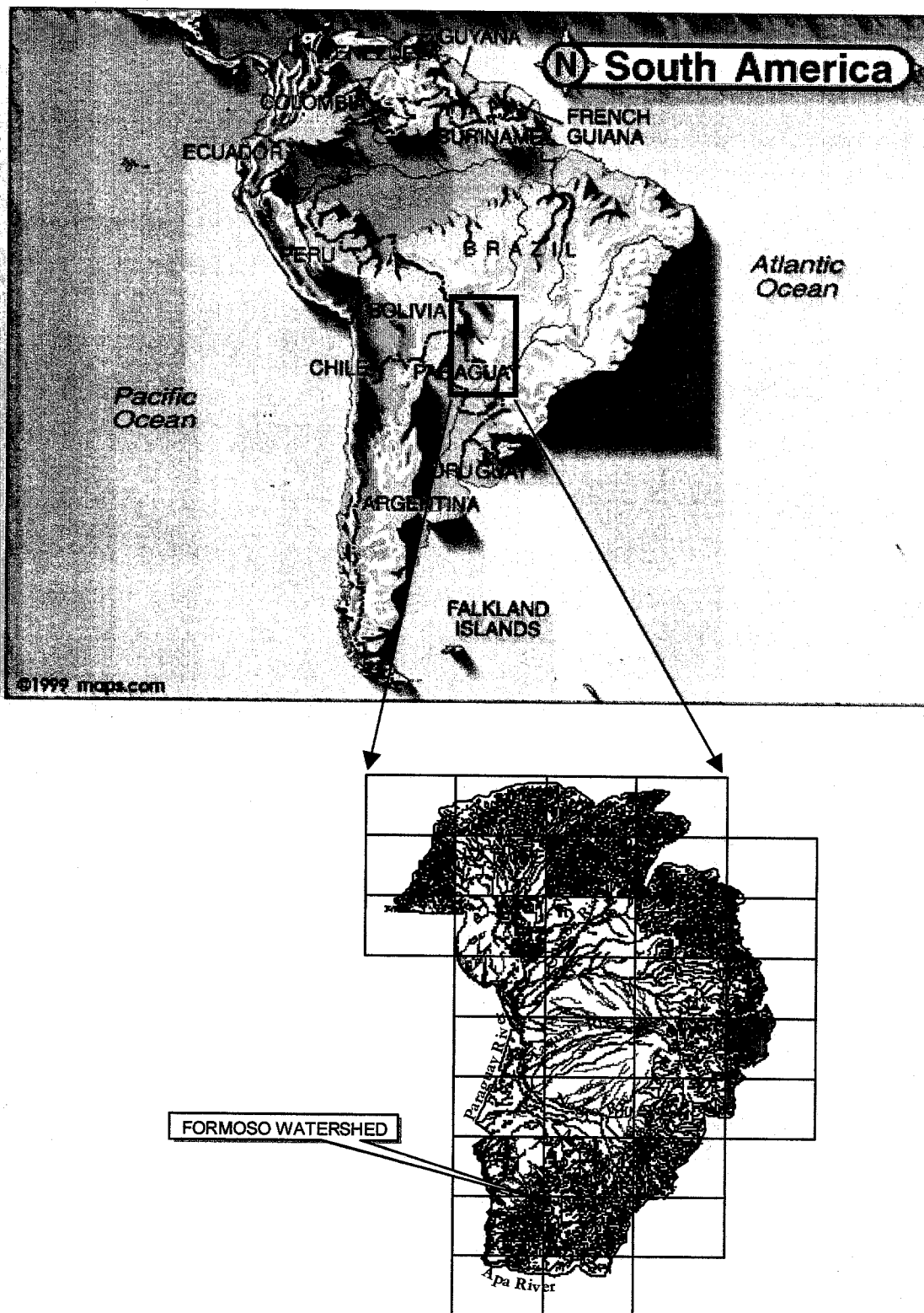






Figure 2 – Location of the Formoso Watershed and the Critical Areas (Mimoso River and Anhumas Stream Catchments).



Legend

-  Bonito City
-  Watershed limits
-  Drainage
-  Critical Areas

0 1 2 3 4 Kilometers



ANNEX F.1 INCREMENTAL COST AND BASE LINE

Component	Activity	Sub-Activity	Incremental Costs	Baseline Description	Baseline Costs	Total Costs
		conservation				
				b) Enforcement and monitoring activities – SEMA budget	15,000	
				c) Strengthening of SEMA's office in Bonito – IDB Pantanal Programme	57,250	133,556
	1.2. Environmental education and training in community participation		20,118			20,118
Subtotal - component 1			313,219		160,356	473,575
2. Development of sustainable economic activities in pilot areas	2.1. Development of alternative economic activities based upon the sustainable use and management of natural resources	2.1.1. Implementation of the Support Centre for Rural Activities and Agricultural Production	29,882	a) Office rental, installation and maintenance (Empaer)	22,000	
				b) Institutional strengthening. Purchase of: 01 small sized car; 01 optic level; 01 GPS for the EMPAER office in Bonito (IDB);	11,500	63,382
		2.1.2. Transformation and use of organic solid residues	67,065	Pilot project for the collection, treatment and adequate disposal of solid residues in Bonito (IDB)	19,400	86,465

ANNEX F.1 INCREMENTAL COST AND BASE LINE

Component	Activity	Sub-Activity	Incremental Costs	Baseline Description	Baseline Costs	Total Costs
		2.1.3. Development of pilot units of multifunction land use	154,178	a) Individual goods and services, limited to US\$3,000 / farmer, for: the construction of terraces and fences; purchase of plantlets for the recovery of gallery forests and small scale commercial afforestation; purchase of green manure seeds; supply of water (IDB)	177,000	
				b) Collective goods and services for: purchase of no tillage field machinery; communitary supply structure for agrochemical sprayers; installation of deposit structures for the disposal of toxic agrochemical recipients; adaptation of internal roads (IDB)	157,000	488,178
	2.2. Training programme on conservation and sustainable use of biological resources		34,441	Rural organization and mobilization directed to the development of actions in micro-catchments; training courses for extension workers and farmers; technical exchanges; production and distribution of technical bibliography (IDB)	20,000	54,441
	Subtotal - component 2		285,566		406,900	692,466
3. Project Management, Monitoring and Evaluation	3.1. Project management and organisation		235483			235,483
	3.2. Project Impact and Output Monitoring Plan		22660			22,660

ANNEX F.1 INCREMENTAL COST AND BASE LINE

Component	Activity	Sub-Activity	Incremental Costs	Baseline Description	Baseline Costs	Total Costs
	3.3. Monitoring of Project Impacts	3.3.1. Monitoring of soil and water indicators	54,333	Monitoring Water Quality of the Formoso river watershed (10 sampling points) – SEMA/FEMAP	143,472	197,805
		3.3.2. Monitoring of terrestrial biodiversity indicators	26,965			26,965
		3.3.3. Monitoring of social and economic indicators	5,566			5,566
	3.4. Project Outreach and Information Dissemination		31,119	Communication for Technological Transfer Project - Embrapa Soils	19,869	50,988
Subtotal - component 3			376,126		163,341	539,467
TOTAL PROJECT			974,911		730,597	1,705,508

Annex F.2 Counterpart

Consolidated Project Budget (GEF Alternative)

COST CATEGORY	Comp-1	Comp-2	Comp-3	Total
<i>Investment Costs</i>				
Equipment	88378	85371	46482	220231
Travel	70060	29160	57380	156600
Technical Assistance (TA)	40696	30420	8000	79116
Total Investment	199134	144951	111862	455947
Total Personnel	3285		66240	69525
Total Recurrent Costs	82325	114654	163831	360810
Total Expenditure	284744	259605	341933	886282
Contingency	28474	25961	34193	88628
PDF				25000
Total GEF Contribution	313218	285566	376126	999910
Counterpart Contribution	398099	512002	266680	1176781
Total Increment	711317	797568	642806	2176691
Total Baseline	160356	406900	163341	730597
Total Project Costs	871673	1204468	806147	2907288

Annex F.2 Counterpart

Component 1 : Participatory planning and management for the conservation and sustainable use of biodiversity

Consolidated Budget

COST CATEGORY	Subact. 1.1.1	Subact. 1.1.2	Subact. 1.1.3	Subact. 1.1.4	Act. 1.2	Total
<i>Investment Costs</i>						
Equipment	4581	37215	36732	9100	750	88378
Travel	33380	5800	19600	7200	4080	70060
Technical Assistance (TA)	12000	10000	14196	4500		40696
Total Investment	49961	53015	70528	20800	4830	199134
Total Personnel	1533		1752			3285
Total Recurrent Costs	14888	7145	25537	21296	13459	82325
Total Expenditure	66382	60160	97817	42096	18289	284744
Contingency	6638	6016	9782	4210	1829	28474
Total GEF Alternative	73020	66176	107599	46306	20118	313218

Component 1: Participatory planning and management for the conservation and sustainable use of biodiversity

Annex F.2 Counterpart

Activity 1.1 Development of a watershed management plan and promotion of integrated management of protected areas in the Formoso watershed

Subactivity 1.1.1. Formulation of the Formoso Watershed Management Plan

COST CATEGORY	Unit	Unit Cost	No. ¹	Y1 ²	Y2	Total
Investment Costs						
Equipment						
<i>Office equipment</i>						
-Steel drawer for fish reference collection	Unit	109	10	1090		1090
- Sattelite imagery	Unit	1500	2	3000		3000
<i>Field equipment</i>	Unit	491	1	491		491
Subtotal						4581
Technical Assistance³						
national	Month	1000	6	6000	6000	12000
Subtotal						12000
Travel⁴						
travel	ticket	500	25	7500	5000	12500
subsistence	per diem	60	348	14880	6000	20880
Subtotal						33380
Total Investment						49961
Personnel						
Salaries⁵	Per diem	7.3	210	1022	511	1533
Total Personnel						1533
Recurrent Costs						
Operation / Maintenance	Unit	1165	5	2330	3495	5825
Consumables for computer equipment	Unit	50	40	1500	500	2000
Consumables for field work				2982	1000	3982
Fuel	L	1	3081	2081	1000	3081
Total Recurrent						14888
Total expenditure						66382
Contingency						6638.2
Total GEF Alternative						73020

1. Number of units required over the whole course of the project

2. Each year column should contain the total sum spent, i.e. number of units required in this year times the unit price indicated in columns 3 and 4.

3. Technical services for treatment of the collected data, including statistics and geoprocessing

4. Includes 6 air tickets and 42 per diem expenses for the subcomponent coordinator, 9 air tickets and 206 per diem expenses for the surveying teams (biodiversity, natural resources, and social-economic).

5. Field support workers for the surveying teams (biodiversity, natural resources)

Annex F.2 Counterpart

Subactivity 1.1.2. Formulation of a strategy for integrated management of protected areas

COST CATEGORY	Unit	Unit Cost	No	Y1	Y2	Y3	Y4	Total
Investment Costs								
Equipment								
<i>Field equipment</i>								
Off-road vehicle	Unit	26315	1	26315				26315
Digital camera	un	1600	1	1600				1600
Clinometer	un	600	2	600	600			1200
GPS	un	800	1	800				800
Binoculars	un	300	1	300				300
Meters and other utensils	global	1000	div.	500	500			1000
<i>Office equipment</i>								
Computer and accessories	un.	1500	1	1500				1500
Lighting desk	un.	2000	1	2000				2000
Office furniture	global	2000	div.	2000				2000
No break	un.	500	1	500				500
Subtotal								37215
Technical Assistance								
National				7300	1800	900		10000
Subtotal								10000
Travel								
Travel	un	500	2	500		500		1000
subsistence	un	60	80	1800	1200	1200	600	4800
Subtotal								5800
Total Investment								53015
Recurrent Costs								
Operation/Maintenance				1245	1100	900	700	3945
Consumables for computer Equipment	Unit	50	18	200	300	300	100	900
Consumables for field work Fuel	L	1	2300	900	700	500	200	2300
Total Recurrent								7145
Total expenditure								60160
Contingency								6016
Total GEF Alternative								66176

Annex F.2 Counterpart

Subactivity 1.1.3. Formulation of Detailed Watershed Management Plans for Two Critical Micro-watersheds

COST CATEGORY	Unit	Unit Cost	No.⁶	Y1⁷	Y2	Total
Investment Costs						
Equipment						
<i>Vehicle</i>						
Off-road 4x4	Unit	26315	1	26315		26315
<i>Office equipment</i>						
Computer and accessories	unit	1500	1	1500		1500
Steel racks for botanical reference collection	Unit	328	14	4592		4592
Freezer (400 l)	Unit	396	2	792		792
<i>Field equipment</i>						
Camp fire	Unit	11	3	33		33
GPS	Unit	500	2	1000		1000
<i>Sampling and measurement tools</i>	Unit	125	20	2500		2500
Subtotal						36732
Technical Assistance⁸						
national & international	Month	4000	3	4000	8000	12000
Trainee (social analysis)	Month	183	12	1098	1098	2196
Subtotal						14196
Travel⁹						
travel	ticket	500	14	3500	3500	7000
subsistence	per diem	60	210	9000	3600	12600
Subtotal						19600
Total Investment						70528
Personnel						
Salaries¹⁰	Per diem	7.3	240	1168	584	1752
Total Personnel						1752

Annex F.2 Counterpart

Recurrent Costs						
<i>Operation / Maintenance</i>	Unit			12337	6000	18337
<i>Car rental</i>	Day	50	10	500		500
<i>Fuel</i>	L	1	2200	1500	700	2200
<i>Computer consumables</i>	Unit	50	30	1000	500	1500
<i>Field work consumables</i>	Unit	10	300	2000	1000	3000
Total Recurrent						25537
Total Expenditure						97817
Contingency						9781.7
Total GEF Alternative						107599

6. Number of units required over the whole course of the project
7. Each year column should contain the total sum spent, i.e. number of units required in this year times the unit price indicated in columns 3 and 4.
8. Topographic assessment; consultancy in micro-watershed management
9. includes 15 air tickets and 301 per diem expenses for both the surveying teams (biodiversity, natural resources, and social-economic) and those taking part in the participatory process (three workshops)
10. field workers to support sampling and data collection (biodiversity and natural resources)

Sub-activity 1.1.4. Harmonisation of existing regulatory framework for integrated watershed management and biodiversity conservation

(US\$)								
COST CATEGORY	Unit	Unit Cost	No	Y1	Y2	Y3	Y4	Total
Investment Costs								
Equipment								
<i>Office equipment</i>								
Furniture	Un	1500	1	1500				1500
<i>Field equipment</i>								
Boat, (canoe)	Un	5000	1	5000				5000
Camera	Un	1600	1	1600				1600
GPS	Un	500	2	1000				1000
Subtotal								9100
Technical Assistance (TA)								
Legal advisor	Un	1500	3	1500	1500	750	750	4500
Subtotal								4500
Travel								
travel								
subsistence	un	60	120	1800	2100	2100	1200	7200
Subtotal								7200
Total Investment								20800
Recurrent Costs								
Operation/Maintenance¹²				1730	2430	2370	1676	8206
Annex F.2 Counterpart								
Consumables for computer equipment	Unit	50	36	400	600	600	200	1800
Consumables for field work								
Fuel	L	1	7790	1870	2350	2350	1220	7790
First aid kit	Un	500	2	500		500	1000	2000
Bibliography	Sets	500	3	500	1000			1500
Total Recurrent								21296
Total expenditure								42096
Contingency								4210
Total GEF Alternative								46306

12. Costs of courses, workshops and meetings

Overhead projector	Un	300	1	300				300
Subtotal								750
Travel								
travel								
subsistence	per diem	60	68	1500	1000	1000	580	4080
Subtotal								4080
Total Investment								4830
Recurrent Costs								
Operation / Maintenance¹¹				4053	3406	2400	1100	10959
Folder production	set	250	10	500	1000	500	500	2500
Total Recurrent								13459
Total expenditure								18289
Contingency								1829
Total GEF Alternative								20118

11. Costs of courses, workshops and meetings.

Component 2. Development of sustainable economic activities in pilot areas

Consolidated Budget

COST CATEGORY	Subact. 2.1.1	Subact. 2.1.2	Subact. 2.1.3	Act. 2.2	Total
Investment Costs					
Equipment	6700	37416	41255		85371
Technical Assistance		4000	16800	9620	30420
Travel		4860	20400	3900	29160
Total Investment	6700	46276	78455	13520	144951
Total Recurrent Costs	20465	14692	61707	17790	114654
Contingency	2717	6097	14016	3131	25961
Total GEF Alternative	29882	67065	154178	34441	285566

"Baume" Airmeter	un	150	2	300				300
Subtotal								6700
Total Investment								6700
Recurrent Costs								
Operation/ Maintenance			8300	4055	4055	4055		20465
Total Recurrent								20465
Total expenditure								27165
Contingency								2717
Total GEF Alternative								29882

1. Number of units required over the whole course of the project

Annex F.2 Counterpart

travel	ticket	500	3	500	500	500	500	1500
subsistence	per diem	60	56	840	840	840	840	3360
Subtotal								4860
Total Investment								46276
Recurrent Costs								
Operation / Maintenance				4555	3379	3379	3379	14692
Total Recurrent								14692
Total expenditure								60968
Contingency								6097
Total GEF Alternative								67065

2. Number of units required over the whole course of the project

Subtotal																		16800
Travel																		
travel	ticket	500	12	3000	1500	1500	1500	6000										
subsistence	per diem	60	240	1440	5760	4320	2880	14400										
Subtotal								20400										
Total Investment								78455										
Recurrent Costs																		
Operation / Maintenance				7761	22810	13105	7761	51437										
Fuel	L	1	3690	410	1640	1230	410	3690										
Office consumables	Unit	82	40	820	820	820	820	3280										
Field work consumables	Unit	50	66	1100	1100	1100		3300										
Total Recurrent								61707										
Total expenditure								140162										
Contingency								14016										
Total GEF Alternative								154178										

Activity 2.2. Training program on conservation and sustainable use of biological resources

COST CATEGORY	Unit	Unit cost	No.	Yr 1	Yr 2	Yr 3	Total
Investment Costs							
<i>Technical Assistance</i>							
National (consultancy)	Hour	35	232	2625	2625	2870	8120
Trainee	Month	250	6	1500			1500
Subtotal							9620
<i>Travel</i>							
travel	ticket	500	6	1000	1000	1000	3000
subsistence	per diem	60	15	300	300	300	900
Subtotal							3900
Total Investment							13520
Recurrent Costs							
<i>Operation / Maintenance</i>							
				4290	9000	4500	17790
Total Recurrent							17790
Total expenditure							31310
Contingency							3131
Total GEF Alternative							34441

1. Number of units required over the whole course of the project

Annex F.2 Counterpart
Component 3. Project Management, Monitoring and Evaluation
Consolidated Budget

COST CATEGORY	Act. 3.1	Act. 3.2	Subact. 3.3.1	Subact. 3.3.2	Subact. 3.3.3	Act. 3.4.	Total
<i>Investment Costs</i>							
Equipment	31815		8957			5710	46482
Travel	19200	6600	11100	9360	4760	6360	57380
Technical Assistance (TA)		8000					8000
Total Investment	51015	14600	20057	9360	4760	12070	111862
Total Personnel	66240						66240
Total Recurrent Costs	96820	6000	29337	15154	300	16220	163831
Total Expenditure	214075	20600	49394	24514	5060	28290	341933
Contingency	21408	2060	4939	2451	506	2829	34193
Total GEF Alternative	235483	22660	54333	26965	5566	31119	376126

Total Investment								51015
Personnel								
Local Manager	Month	960	48	11520	11520	11520	11520	46080
Secretary	Month	420	48	5040	5040	5040	5040	20160
Total Personnel								66240
Recurrent Costs								
Operation / Maintenance								
Printing Services	Month	80	73	1460	1460	1460	1460	5840
Car maintenance	month	24	200	1200	1200	1200	1200	4800
Bureau rental plus maintenance ⁵	Month	600	48	7200	7200	7200	7200	28800
Car rental ⁶	Day	50	20	250	250	250	250	1000
Fuel	L	1	7200	1800	1800	1800	1800	7200
Communication ⁷	Unit	5	480	600	600	600	600	2400
Consumables for computer & stationary	Unit	50	30	500		500	500	1500
Subtotal								51540
Private Foundation	% ⁸	6						45280
Total Recurrent								96820
Total expenditure								214075
Contingency	%	10						21407.5
Total GEF Alternative								235483

1. Number of units required over the whole course of the project.

2. Each year column should contain the total sum spent, i.e. number of units required in this year times the unit price indicated in the 3rd column.

3. Personal computer to house the database and for the local project office.

3^a Vehicle for the Project Technical Coordinator, monitoring tasks and support to project logistics.

4. Includes air tickets and per-diem expenses for the project co-ordinator and consultants.

5. Local bureau required over the whole course of the project.

6. Car rental for the project co-ordinator

7. Communication by telephone, fax and mail.

8. Percentage over total GEF alternative for the project executing expenses

Annex F.2 Counterpart

Activity 3.2 - Project Impact and Output Monitoring Plan

								US\$1.00
COST CATEGORY	Unit	Unit Cost	No. ¹	Y1 ²	Y2 ²	Y3 ²	Y4	Total
Investment / Equipment								
<i>Technical Assistance</i>								
<i>Consultancy</i> ³	Month	2000	4	2000	2000	2000	2000	8000
Subtotal								8000
<i>Travel</i>								
Domestic Travel ⁴	Ticket	500	6	1000		1000	1000	3000
Subsistence	per diem	60	60	900	900	900	900	3600
Subtotal								6600
Total Investment								14600
Recurrent Costs								
<i>Operation / Maintenance</i>								
Consumables for computer & stationary	Unit	50	30	500		500	500	1500
Subtotal								6000
Total Recurrent								6000
Total expenditure								20600
Contingency	%	10						2060
Total GEF Alternative								22660

1. Number of units required over the whole course of the project.

2. Each year column should contain the total sum spent, i.e. number of units required in this year times the unit price indicated in the 3rd column.

3. Project monitoring and evaluation

4. Includes air tickets and per-diem expenses for the general co-ordinator of the project and consultants.

Annex F.2 Counterpart

Activity 3.3. Monitoring of project impacts

Sub-activity 3.3.1. Monitoring of soil and water indicators

COST CATEGORY	Unit	Unit Cost	No. ¹	Y1	Y2	Y3	Y4	Total
Investment Costs								
<i>Technical Assistance (TA)</i>								
Consultancy	day	100	40		4000			4000
Equipment								
<i>Laboratory equipment</i>								
Desiccator	un	383	2	766				766
Shaker and accessory	Un	1044	1	1044				1044
Magnetic stirrer	Un	437	1	437				437
Vacuum pump	Un	710	1	710				710
<i>Field equipment</i>								
Automatic monitoring station	Un	3000	2	6000				6000
Subtotal								8957
Travel								
travel	air tickets	500	12	1500	1500	1500	1500	6000
subsistence	per diem	60	45	900		1800		5100
international travel	ticket	2000	1		2000			2000
Subtotal								11100
Total Investment								20057
Recurrent Costs								
<i>Operation/ Maintenance</i>				4100	1189	3344	3344	11977
Fuel	L	1	1558	502	502	502	502	1558
<i>Lab consumables</i>				956		900	900	2756
<i>Lab analyses</i>				2223	2223	2223	2223	8892
<i>Sampling</i>				813	813	813	813	3252
<i>Office consumables</i>				136		137	137	410
<i>Field consumables</i>				164		164	164	492
Total Recurrent								29337
Total expenditure								49394
Contingency								4939
Total GEF Alternative								54333

1. Number of units required over the whole course of the project

Annex F.2 Counterpart

Sub-activity 3.3.2. Monitoring of terrestrial biodiversity indicators								
COST CATEGORY	Unit	Unit cost	No³	Yr 1	Yr 2	Yr 3	Yr 4	Total
Investment Costs								
<i>Travel</i>								
subsistence	per diem	60	94	1680	1800	1440	1440	6360
Travel	ticket	500	6		1000	1000	1000	3000
Subtotal								9360
Total investment								9360
Recurrent Costs								
Operation/ Maintenance								
				1613	2844	3235	3235	10927
Field consumables								
					1789	1219	1219	4227
Subtotal								15154
Total Expenditure								24514
Contingency								2451.4
Total GEF Alternative								26965

Sub-activity 3.3.3. Monitoring of social and economic indicators						
COST CATEGORY	Unit	Unit cost	No⁴	Yr 3	Yr 4	Total
Investment Costs						
<i>Travel</i>						
subsistence	per diem	60	46	1380	1380	2760
Travel	ticket	500	4	1000	1000	2000
Subtotal						4760
Total Investment						4760
Recurrent Costs						
Fuel						
	L	1300	150	150		300
Subtotal						300
Total Expenditure						5060
Contingency						506
Total GEF Alternative						5566

Annex F.2 Counterpart

Activity 3.4. Project Outreach and Information Dissemination

COST CATEGORY	Unit	Unit Cost	No. ⁴	Y2	Y3	Y4	Total
Investment Costs							
Equipment							
<i>Office equipment</i>							
Datashow	un	5110	1	5110			5110
Datashow software	un	600	1	600			600
Subtotal							5710
Travel							
<i>travel</i>	ticket	500	3	500	500	500	1500
<i>subsistence</i>	per diem	60	81	1620	1620	1620	4860
Subtotal							6360
Total Investment							12070
Recurrent Costs							
<i>Operation / Maintenance</i>				4290	7430	4500	16220
Total Recurrent							16220
Total expenditure							28290
Contingency							2829
Total GEF Alternative							31119

4. Number of units required over the whole course of the project